REPORT OF DATA COLLECTED FOR ECOLOGICAL STUDIES FOR THE OYSTER CREEK GENERATING STATION

SEPTEMBER 1978 - MARCH 1979

PART ONE

FINFISH, SHELLFISH, AND PLANKTON

by

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INTRODUCTION

The Oyster Creek Generating Station (OCGS) of Jersey Central Power and Light Co. is a 620 MWe boiling water reactor which has been in commerical operation since December 1969. It is located 3.2 km inland from Barnegat Bay in Lacey Township, New Jersey. Oyster Creek and the South Branch of Forked River have been modified as a discharge and intake canal, respectively (Fig. 1). When OCGS is in operation, the flow in the South Branch of Forked River is always upstream toward OCGS, and the flow in Oyster Creek is always downstream toward Barnegat Bay. Tidal range at the mouth of Oyster Creek is 0.15 m (U. S. Atomic Energy Commission, AEC 1974).

Barnegat Bay is a relatively large (surface area 16,714 ha), shallow (average depth 1.5 m) estuary (AEC 1974). The eastern Bay contains extensive shoals (depth 0.2 to 0.9 m); the central and western Bay is deeper and ranges from 1.2 to 3.7 m (National Oceanic and Atmospheric Administration, NOAA 1976). Interchange of water between the Atlantic Ocean and the Bay is limited and occurs through Barnegat Inlet which is narrow (Makai 1973, Carpenter 1963). Normal tidal range in Barnegat Bay is 0.3 m (Makai 1973).

Several studies of Barnegat Bay and OCGS were conducted prior to those undertaken by Ichthyological Associates, Inc. (I.A.). Makai (1973) reported on the physicochemical parameters of upper Barnegat Bay, and Halgren (1973) conducted a study on the recreational usage of the upper Bay. Wurtz (1969), Marcellus (1972), and McClain (1973) reported on the

fishes of the Bay. Wurtz (1972) also reported preliminary findings on impingement of fishes and crabs at OCGS. Wurtz (1965, 1971) conducted brief studies of zooplankton and ichthyoplankton in limited portions of the Bay, and Sandine (1973) studied the condition of microzooplankton entrained at OCGS. Rutgers University investigated the benthic invertebrates and benthic algae (Loveland et al. 1966-1972, 1974); this work was reviewed by Vouglitois (1976).

Since 8 September 1975, I.A. has conducted studies to determine and assess the biological impact of OCGS and its discharges and has made general ecological surveys of Barnegat Bay, Oyster Creek, and Forked River. Data collected from September 1975 through August 1978 were reported by Tatham et al. (1977a, b; 1978a, b) and Danila et al. (1979). This report presents data from impingement and entrainment sampling programs and from fin- and shellfish collections made at selected stations in Barnegat Bay from September 1978 through March 1979. Since this document serves primarily as a progress report, the emphasis is on presentation of the data rather than extensive analyses.

Impingement and fisheries studies emphasized fin- and shellfish designated as important by the U. S. Environmental Portection Agency (EPA) and the U. S. Nuclear Regulatory Commission (NRC). These were the Atlantic menhaden, bay anchovy, Atlantic silverside, threespine stickleback, northern pipefish, striped bass, bluefish, weakfish, northern kingfish, summer flounder, winter flounder, northern puffer, sand shrimp, and blue crab. The life history of most of these species were reported by Tatham et al. (1977a, 1978a). The common and scientific

names of all vertebrates and invertebrates taken by the impingement and fisheries programs are given in Tables 1 through 3.

Emphasis in the plankton program was also placed on forms designated as important by the EPA or NRC. Important macrozooplankton were the ctenophores Mnemiopsis leidyi and Beroe spp., the arrowworms Sagitta elegans and Sagitta spp., the sand shrimp Crangon septemspinosa, grass shrimp Palaemonetes spp., the mysids Neomysis americana and Mysidopsis bigelowi, polychaete epitokes and individuals less than 1 mm, and blue crab zoeae and megalopae. Important ichthyoplankton included the eggs and larvae of the Atlantic menhaden, bay anchovy, threespine stickleback, northern pipefish, striped bass, bluefish, weakfish, northern kingfish, summer flounder, winter flounder, and northern puffer.

IMPINGEMENT OF FISHES AND MACROINVERTEBRATES ON THE TRAVELING SCREENS

Gerald J. Miller and Donald J. Danila

Introduction

Since September 1975, Ichthyological Associates, Inc. has studied the effect of the impingement of organisms on the vertical traveling screens which protect the intake to the OCGS circulating-water system. Impingement data have been reported from 8 September 1975 through 2 September 1978 (Miller 1977, 1978, 1979b). Data presented here are a continuation of those studies and include collections from 3 September 1978 through 31 March 1979. The objectives of these studies were to determine the species composition and abundance of organisms impinged on the OCGS screens and their survival rate when returned to Barnegat Bay. An evaluation of these losses on the populations in Barnegat Bay was discussed by JCP&L (1978).

Materials and Methods

Samples of impinged organisms were taken from the sluiceway after the last traveling screen and from the sluiceway pit (Fig. 2). Physicochemical parameters, which included air and water temperature, salinity, dissolved oxygen, and pH, were recorded with each collection. A 45.7 x 50.8 x 61.0-cm wire basket (10.7-mm mesh) was used to collect organisms from the sluiceway (Sta. 8) to determine their condition. A 101.6 x 101.6 x 121.9-cm wire basket (10.7-mm mesh) was used to collect organisms from the sluiceway pit.

Samples were usually taken two nights a week during two periods; period 3 was from sunset to 6 h after sunset and period 4 was from 6 h after sunset to sunrise. After the screens were washed at the beginning of the sampling period, the pit sampler was lowered into place. Subsequently, the screens washed automatically either every hour or when the pressure differential across the screens reached a critical level. Automatic screen washes usually involved about two complete rotations of the screens and lasted for approximately 20 min. Screen washes triggered either manually or by differential pressure lasted from 10 to 11 min.

After the screens had washed for 1 min, the sluiceway sampler was inserted. After 1 min or less, depending on the abundance of organisms, it was removed and the organisms were placed on a 3.9-m^2 sorting table. The sluiceway sampler was replaced, and the procedure repeated until a maximum of six, 1-min samples was taken during the screen wash. For 20-min screen washes, the sluiceway sampler was used only during the first 11 min of the wash.

Collections from the sluiceway sampler were rapidly processed on the sorting table. Fishes were placed into water in insulated coolers, and crabs were placed into 10-liter plastic buckets. The condition (live/dead/damaged) of the organisms was determined 5 to 10 min after the last sluiceway sample was taken. Live denoted a specimen which had no apparent damage and which was swimming normally. Damaged specimens were alive (opercular movement in fishes) but had external damage or abnormal behavior. Dead fishes showed no opercular movement, and dead invertebrates showed

no movement of either appendages or mouth parts. Condition samples were taken until the program was terminated on 5 February 1979.

Organisms washed from the screen and not collected in the sluiceway sampler passed into the pit sampler. At the end of the screen wash, the pit sampler was removed and the specimens were processed. Whenever necessary, the number and weight of abundant species were estimated volumetrically in the following manner. After all the less numerous species were removed from the sample, the remaining debris and abundant organisms were thoroughly mixed and a known volume removed. The number and weight of the abundant species in this subsample were determined and were used to estimate their number and weight in the total sample.

When the screens washed frequently or continuously, it was not always possible to collect all impinged organisms because the screen wash would have overflowed the pit sampler. To avoid this, the pit sampler was removed before it overflowed, and some portion of the screen wash was missed. If this occurred, the portion of the screen wash that was sampled was used to estimate the total number and weight of organisms impinged during that period.

For a week, estimated impingement during a period (W_a) was calculated by the formula:

$$W_a = \frac{P_a \cdot 7}{s}$$

P_a = actual or extrapolated number or weight of specimens impinged in a period during a week.

s = number of times a period was sampled during the week.

The sum of the estimated weekly impingement at night during each of the two periods was the total weekly impingement estimate at night. A

Hewlett-Packard 9830A programmable calculator was used for data compilation and statistical analysis.

Stratified sampling with optimal allocation (Snedecor and Cochran 1967) was used to estimate the total number of organisms and number of specimens of various species impinged during the 7 months. The mean number impinged during the 7 months (Y_{st}) was estimated by the formula:

$$\bar{Y}_{st} = \sum \left[\left(N_a/N \right) \cdot \bar{Y}_a \right]$$

N_a = number of sampling units in stratum a.

N = number of sampling units in all strata sampled.

$\bar{Y}_a$ = sample mean in stratum a.

The strata were the two time periods sampled during the night. The sampling unit size was 1 h, and each sample mean was expressed as the number of specimens impinged per hour. This sample mean was derived by dividing the number of individuals taken from all samples collected during a time period by the total duration of these samples. This weighted mean of the number impinged per hour was used as a single sample because the duration of individual samples in a time period was unequal.

The total number of individuals impinged at night during the 7 months (Y) was computed by the formula:

$$Y = \bar{Y}_{st} \cdot D \cdot T$$

D = the number of days the OCGS screens operated during the 7 months.

T = 13.3 (daily average hours of darkness for the 7 months sampled).

Results and Discussion

A total of 228 collections was taken from 3 September 1978 through 31 March 1979 with 105 collections taken in period 3 and 123 collections in period 4 (Appendix Table 1). No collections were taken between 19 September and 21 November because OCGS was shut down.

Physicochemical parameters associated with each collection were summarized weekly (Table 4). Typical seasonal trends in water temperature and dissolved oxygen were apparent. Weekly mean bottom water temperature declined from 23.4 C in early September to 0.3 C in mid-February. The temperature increased rapidly in March and reached 9.6 C during the last week of the month. The dissolved oxygen concentration generally varied inversely with temperature; the greatest mean value (13.9 ppm) was recorded in late February through early March. The mean bottom salinity ranged from 15.5 to 16.0 ppt in September, 17.3 to 20.5 ppt from mid - November through early March, and 9.3 to 12.3 ppt for the remainder of March. The latter decrease probably resulted from the spring snowmelt and increased precipitation. The weekly mean of pH values were 7.5 to 8.1.

An estimated 4,221,475 $\pm$ 659,998 fish and macroinvertebrates (90 taxa) that weighed 25,141 $\pm$ 6,905 kg were estimated by the stratified sampling method to have been impinged at night (Table 5; Appendix Tables 2 through 4). Most (77%) of the biomass impinged consisted of fish (19,441 $\pm$ 6,837 kg); 5,701 $\pm$ 977 kg (23% of the biomass) were comprised of invertebrates (Table 5). However, fish (65 taxa; 453,383 $\pm$ 93,426 individuals) made up only 11% of all organisms. The invertebrates (25 taxa; 3,768,091 $\pm$ 598,267 individuals) dominated the catch numerically.

The most numerous fishes were the Atlantic silverside (n=135,625; 30% of the total catch of fish), winter flounder (128,883; 28%), and blueback herring (83,849; 18%). The threespine stickleback (4%), American eel (4%), and northern pipefish (4%) were also common. The most important fish by weight was the winter flounder (17,084 kg) which made up 88% of the fish biomass. The Atlantic menhaden (4%), Atlantic silverside (3%), and blueback herring (2%) comprised most of the remaining fish biomass.

Although the sand shrimp was the most numerous macroinvertebrate impinged (n=3,302,364; 88% of the macroinvertebrates), it comprised only 53% of the macroinvertebrate biomass (3,013 kg). Fewer blue crab (45,937; 1%) were impinged, but it was important by weight (2,372 kg; 42% of the macroinvertebrate biomass). The grass shrimp (11% by number, 3% by weight) was the only other abundant macroinvertebrate.

Weekly impingement estimates were determined but these were not used to estimate total impingement for the 7-month period (Tables 6 through 8). Most impingement of a species occurred during a few weeks over a relatively small temperature range as species abundance and impingement were related to water temperature (Table 9). Most (85%) of the impinged fish were collected from 10 December through 10 February which included most of the Atlantic silverside (89%) and winter flounder (84%). Most (92%) of the Atlantic silverside were impinged at a water temperature of 2 to 8 C, and 8% of the winter flounder were taken from -1 to 5 C. Some 80% of the blueback herring were impinged from 10 December through 6 January, and most (95%) of the threespine stickleback were collected from 21 January through 17 March. During 1 week (4 through 10 February) most (97%) American eel were taken. These specimens were glass eels (Hardy 1978) of

about 50 to 60 mm in length and contributed little (4.8 kg) to the biomass.

Similarly, 86% of the sand shrimp and grass shrimp were taken from 10 December through 17 February. Most (80%) of the sand shrimp were impinged at a water temperature of 0 to 8 C and 95% of the grass shrimp were taken at 0 to 12 C. However, 88% of the blue crab were impinged from 3 through 23 September, most at 18 to 25 C.

From 24 through 30 December, the largest number of specimens (6,050) were impinged per hour of darkness and from 17 through 23 September the least number of specimens (13) were impinged (Table 10). The maximum impingement per 10 million liters of circulating water flow (598 specimens) occurred from 17 through 23 December and the least (5) from 17 through 23 September. However, only two circulating water pumps were on from 17 through 23 September.

Some 3,952 specimens were examined for condition (Table 11; Appendix Table 5). Most (68%) specimens were live, 22% were damaged, and 9% were dead. The bay anchovy (46% dead), Atlantic silverside (13%), and blueback herring (13%) comprised 81% of the dead fish. Less than 1% of the winter flounder were dead, but 41% were damaged. The sand shrimp had a mortality of 14% and the blue crab 3%.

Although OCGS was shut down for about 2 of the 7 months in which sampling was conducted, some comparisons may be made with a similar 7-month period in 1977-78 (Miller 1979a). Only 228 collections were made in 1978-79 that produced 90 taxa as compared to 363 collections in 1977-78 (111 taxa), but an estimated 315,000 additional specimens and about 6,000 kg more biomass were impinged from September 1978 through March 1979. Similar

percentages of fish (9% in 1977-78, 11% in 1978-79) and invertebrates (91%, 87%) were taken in both periods. The greatest difference was in the catch of winter flounder. An estimated 128,883 winter flounder (17,084 kg) were impinged in 1978-79 as compared to 22,710 individuals (4,404 kg) in 1977-78. The number of winter flounder impinged has increased each year since 1975-76 and this was probably related to the large year-classes produced from 1976 through 1978 (Danila 1977a, Metzger 1979). However, weather and plant operating conditions also have affected impingement of winter flounder to some degree (Danila 1978b). As for example, Danila (1978b) reported that a smaller mean number of screens and greater number of circulating pumps in operation at OCGS in combination with colder water temperatures probably resulted in greater impingement of winter flounder in 1976-77 than in 1975-76. Thomas and Miller (1976) noted increased impingement at OCGS associated with strong northeast winds and storms.

Large decreases in the number of Atlantic menhaden (72%), bay anchovy (93%), weakfish (96%), and blue crab (78%) also occurred between 1977-78 and 1978-79. Greatest impingement of these species during the September through March period usually occurs in October and November. Consequently, most of the differences in impingement between years was probably due to the OCGS shutdown. The 38% decrease in estimated biomass of blue crab from 1977-78 (3,798 kg) to 1978-79 (2,372) was less than the 78% decrease in number which indicated that mostly larger crabs were impinged in the latter period. The spot also is impinged mostly in the fall, but the number of spot present in the Bay in 1978 was significantly less than in 1977. Fewer than 100 were impinged in 1978-79 as compared to an estimated

58,688 for 1977-78 (Miller 1977a). This species typically demonstrates large yearly variations in abundance in the mid-Atlantic region (Joseph 1972).

Maximum impingement of the blueback herring, Atlantic silverside, sand shrimp, and grass shrimp occurs from mid-November through early February and thus the 1977-78 and 1978-79 periods are largely comparable for these species. Each of these species was impinged in larger numbers in 1978-79 than in 1977-78. These increases may have been due to their greater abundance in 1978-79. However, as with winter flounder, weather and plant operating conditions probably influenced impingement to some degree. A small decrease (277 kg) in estimated biomass of sand shrimp actually occurred between the periods and although 1.7 times as many grass shrimp were taken, only an 11% increase in weight was recorded. Larger numbers of smaller individuals of both species may have been impinged in 1978-79 than in 1977-78.

IMPINGEMENT OF FISHES AND MACROINVERTEBRATES ON THE PROTOTYPE RISTROPH SCREEN

Gerald J. Miller

Introduction

Since September 1975, Ichthyological Associates, Inc. has determined the species composition, abundance, and mortality of organisms impinged on the vertical traveling screens that precede the intake to the circulating water system. In an attempt to mitigate these mortalities, JCP&L has planned the installation of a continuously rotating traveling screen modified with a low pressure spray wash and fish recovery and return system (i.e., Ristroph screen).

A study to determine the efficiency of the Ristroph screen in reducing fish and macroinvertebrate impingement mortality was begun in May 1978 with the installation of a prototype screen at OCGS (Miller 1979c). The main objective of this program was to compare the condition (live, damaged, dead) of organisms impinged on the Ristroph screen to that of organisms impinged on the conventional traveling screens at OCGS. In addition, the effectiveness of the low pressure spray in removing organisms from the Ristroph screen was determined. This report covers data collected from 28 November 1978 through 9 January 1979, when the program was terminated. No data were collected from 15 September through 28 November due to a scheduled OCGS shutdown.

Materials and Methods

Samples were taken in the upper (live) and lower (debris) troughs which ran from the rear of the Ristroph screen to the sluiceway in front of the screen (Fig. 3). As many sets of samples as practical were taken once a week from sunset to 6 h after sunset. During the week of 24 December, an additional set of samples was taken because more fish were impinged at that time.

With the Ristroph screen washing continuously, a 100 x 60 x 20-cm metal frame with a 1-m long section of nylon netting (1-cm stretch mesh) was placed in the live trough. Simultaneously, an identical sampler was placed in the debris trough. After 1 min or less, depending on the abundance of organisms, the two samplers were removed, and organisms were processed on a 0.8-m^2 sorting table. Most organisms from each trough were placed in water in separate insulated coolers, but crabs were placed in separate 10-liter plastic buckets. The samplers were then replaced, and the procedure repeated usually until a maximum of 10 samples was taken from each trough. Less than 10 samples were taken only if the number of organisms collected reached the holding capacity of the coolers. When few specimens were impinged, an additional sample was taken by placing the samplers simultaneously in the two troughs for a period of 30 min. This was only done once during the present reporting period.

About 5 min after a set of samples were collected, the condition (live, damaged, dead) of the specimens was determined. Live denoted a specimen which had no apparent damage and which was swimming normally.

Damaged specimens were alive (opercular movement in fishes) but showed external damage or abnormal behavior. Dead fish showed no opercular movement, and dead invertebrates showed no movement of either appendages or mouth parts.

The efficiency of the low pressure spray in removing organisms from the screen was expressed as the percentage of the specimens taken in the live trough. Data from collections made to determine condition of organisms were used to examine the effectiveness of the low pressure spray.

Results and Discussion

A total of 54 samples (total sampling time of 560 min) was taken from 28 November 1978 through 9 January 1979 (Appendix Tables 6 and 7). Of the 4,479 specimens impinged, most (91%, n=4,058) were invertebrates and 9% (421) were fish. The sand shrimp (94% of the invertebrates) comprised 85% of the specimens collected. The winter flounder (37% of the fish), naked goby (17%), northern pipefish (12%), and Atlantic silverside (10%) made up 76% of the fish impinged (Table 12).

Only 19% of the fish and 31% of the invertebrates were washed into the live trough and this indicated that the spray pressure was too low for proper operation. Previous sampling (18 August to 15 September 1978) showed that about 73% of the specimens impinged were washed into the live trough after a valve that increased the live trough spray pressure was installed (Miller 1979c). Before the valve was installed, 56% of the organisms impinged were washed into the live trough. Of the invertebrates in the present study, 32% of the sand shrimp and 21% of the grass shrimp

were washed into the live trough. Some 29% of the northern pipefish, 24% of the Atlantic silverside, 13% of the naked goby, and 13% of the winter flounder were washed into the live trough.

The condition of 3,821 invertebrates and 414 fish was determined (Table 13). The mortality from both troughs combined was higher for fish (21%) than for invertebrates (4%). Representative mortalities from both troughs combined were 13% dead for the Atlantic silverside, 27% for the fourspine stickleback, 4% for the northern pipefish, and 83% for the naked goby. No winter flounder were dead and only 6% of the grass shrimp and 4% of the sand shrimp were dead. The results obtained for specimens washed into the debris trough reflected those for both troughs combined as most specimens were washed into the debris trough and few into the live trough.

Mortalities are higher when more specimens are washed into the debris trough than into the live trough because of the greater spray pressure for the debris trough. However, combined mortalities for both troughs were lower than those found for the conventional traveling screens with the winter flounder (0% for the former, 0.8% for the latter), grass shrimp (6%, 11%), and sand shrimp (4%, 14%). Nevertheless, data presented here and previously (Miller 1979c) indicate a need to adjust for proper spray pressures in both the live and debris troughs to achieve maximum survival of organisms with the Ristroph screen.

FISHES, THE SAND SHRIMP, AND THE BLUE CRAB TAKEN AT SELECTED STATIONS IN WESTERN BARNEGAT BAY

Donald M. Byrne

Introduction

This report covers investigations conducted from September 1978 through March 1979 which are a continuation of studies conducted in western Barnegat Bay since September 1975. The objectives of these studies are to determine the species composition and relative abundance of fishes, the sand shrimp, and the blue crab in western Barnegat Bay and the effect of the OCGS heated discharge on the distribution of these organisms at the mouth of Oyster Creek. Data from these studies may be compared with those of earlier investigations (Marcellus 1972; McClain 1973; Danila 1977, 1978a, 1979) to assess yearly differences in the fish community of western Barnegat Bay.

Materials and Methods

Monthly samples were collected by trawl and seines from the mouth of Cedar Creek (Sta. 1), Forked River (4), Oyster Creek (17), and Double Creek (23) from September 1978 through March 1979 (Fig. 1, Table 14). All stations were sampled during the day, and stations at Forked River and Oyster Creek were also sampled at night, between 1 and 4 h after sunset. In January, however, ice prevented seining at Cedar Creek and in February only Oyster Creek was sampled by seine because ice covered all the other stations and dredging activities prevented access by boat for trawling.

Two consecutive 5-min hauls of a 4.9-m semiballoon otter trawl were made at each station. The trawl had a 4.9-m headrope, 5.8-m footrope, and 61.0 x 30.5-cm doors. It had a 3.8-cm nylon stretch mesh body and a 3.2-cm stretch mesh codend fitted with a 1.[illegible]-cm stretch mesh inner liner. It was towed at 1,600 rpm from a 6.4-m MonArk work boat, and an average haul covered 771.75 m^2. The second haul was made after the first collection was processed on board.

Two hauls of a 45.7 x 2.4-m nylon bag seine (1.3-cm stretch mesh) were made, one before and one after two collections with a 12.2 x 1.5-m (0.6-cm stretch mesh) seine. Each haul was made in an area adjacent to and not overlapping the location previously sampled. The 45.7-m seine was set in a semicircle from a 4.3-m aluminum boat with both net ends at or near shore when the net was fully deployed. The net was then pulled to shore by hand. An average haul covered approximately 3,300 m^2. The 12.2-m seine was set by holding one brail stationary at the water's edge and sweeping the fully extended net through the water in a semicircle. The area covered was 223 m^2.

The fish and invertebrates collected in each sample were counted and released. Fish that could not be identified in the field were returned to the laboratory; uncommon species were preserved in 10% formalin and stored in 40% isopropanol in a voucher collection. Invertebrates other than sand shrimp and blue crab were identified in the field to the lowest practical taxon. These other species of invertebrates were counted or estimated, and their relative abundance categorized as rare (1 to 10 individuals or colonies), occasional (11 to 100), common (101 to 1,000), or abundant (> 1,000).

Results and Discussion

From September 1978 through March 1979, 11,755 fish (30 species) were collected by trawl and seines (Table 15; Appendix Tables 8 through 10). The most numerous species (1% or more of the total catch) were the Atlantic silverside (n = 4,675, 39.8%), bay anchovy (4,404, 37.5%), fourspine stickleback (860, 7.3%), blueback herring (333, 2.8%), winter flounder (313, 2.7%), northern pipefish (250, 2.1%), and mummichog (187, 1.6%). Most fish (n = 10,020, 85.2%) were collected from September through December, and the number taken in each of these months ranged from 1,768 (15.2%) to 3,274 (28.2%). The numbers taken by trawl and 12.2-m seine were similar; each gear accounted for 40.7 (n = 4,788) and 40.3% (4,735) of the total, respectively (Tables 16 and 18). Although it covered 14 times the area of the 12.2-m seine, the 45.7-m seine caught only about half as many fish (n = 2,232, 19.0% of total) because its larger mesh permitted the escape of the smaller, more numerous fishes, especially the Atlantic silverside (Table 17).

The species composition of the catch by each gear was similar. Of those fishes represented by 15 or more individuals, only three were not common to all gears; the striped killifish (n = 25) was not collected by trawl, and the alewife (49) and oyster toadfish (83) were not taken by 12.2-m seine. Although the seven most numerous species were taken by all gears, one gear accounted for 60% or more of the total catch of each. Most bay anchovy (n = 3,837, 87.1%) and winter flounder (219, 70.0%) were collected by trawl, the majority of Atlantic silverside (3,569, 76.3%), fourspine stickleback (525, 61.0%) and mummichog (163, 87.2%) were taken by 12.2-m seine, and most blueback herring (261, 78.4%) and northern

pipefish (185, 74.0%) were taken by 45.7-m seine. A rare species, the opossum pipefish (Oostethus lineatus), was collected by 45.7-m seine in September near the mouth of Double Creek. This is the first time it has been taken during ecological sampling for OCGS. Only 87 specimens have previously been recorded from the United States, with McClellanville, South Carolina the previous northernmost location (Gilmore 1977).

Some 37,503 sand shrimp and 474 blue crab were collected during the study period. Most sand shrimp were taken in December (n = 20,516, 54.7%) and most blue crab in September (159, 33.5%) and October (123, 25.9%). About half of all sand shrimp were taken by trawl and each seine accounted for about 25% of the total. Most blue crab were taken by 45.7-m seine (n = 291, 61.4%).

In paired day-night collections made at Oyster Creek and Forked River, the catch at night (all gears combined) was generally larger than during the day (Table 19). For all samples combined, more fish (68.5%), sand shrimp (86.3%), and blue crab (67.3%) were taken at night than during the day. Catches of the seven most numerous fishes were 1.8 (mummichog, northern pipefish) to 5.2 (blueback herring) times greater at night than during the day.

A comparison of the monthly daytime catches at each of the four stations showed that the catch at Oyster Creek was generally smaller than the catches at the other stations until January (Table 20). From September through December, the catch at Oyster Creek accounted for only 2.6 to 17.1% of the monthly totals, but in January and March it represented 54.0 and 43.7%, respectively.

Danila (1978a) reported that when OCGS was in operation, more fish and blue crab were taken in Oyster Creek than in comparable areas of Forked River, and largest differences occurred in spring, fall, and winter. When OCGS was not in operation, however, the catch in both areas was generally similar. The comparatively larger catches in Oyster Creek in January and March during this study, therefore, were probably the direct result of the resumption of the OCGS heated discharge in mid-December. Except for 8 to 13 December, OCGS was shut down from 16 September to 19 December and heated water was not discharged into Oyster Creek. Average water temperature at the Route 9 bridge was 7.2 C (range of 6.1 to 8.3 C) the week of 1 through 7 December, was 10.3 C from 8 to 13 December, and reached a low of 2.2 C on 18 December (mean of 4.7 C from 14 to 18 December). Consequently, the attraction and retention of fishes by the thermal plume during fall, a phenomenon reported in previous studies (Danila 1977, 1978a, 1979), did not occur in 1978 to the extent that it did previously.

Danila (1978a) reported that when heated water was discharged during fall 1976, some warm-water migrants such as Atlantic menhaden, bluefish, weakfish, spot, and jacks were attracted to and remained in Oyster Creek. Some individuals, mainly Atlantic menhaden, bluefish, and spot, successfully overwintered in Oyster Creek. During fall 1978, however, warm-water migrants were not taken after October, except for two stragglers collected in November, one permit (a jack) and one weakfish.

Although the proportion of organisms taken at the mouth of Oyster Creek increased with the resumption of heated discharge, the number of organisms taken remained about the same. The total catch in January and

March was similar to that in December and the relative increase was actually due to a decrease in catch at the other three stations. Thus, the discharge of warm water during winter apparently maintained some fishes and invertebrates at Oyster Creek.

Despite the relatively cool water temperatures found in Oyster Creek during mid-December, some Atlantic menhaden evidently were attracted to Oyster Creek and remained there to overwinter. A fish kill which occurred on 15 January 1977 when OCGS shut down accidentally consisted almost entirely of Atlantic menhaden. The condenser discharge temperature decreased from 14.4 to 0.6 C and dead Atlantic menhaden were recovered from the banks of the discharge canal about 1 h 45 min afterwards. Four and one-half hours after the shutdown, an estimated 200 dead Atlantic menhaden were observed in the discharge canal. In all, 682 dead Atlantic menhaden were retrieved from the edges of the discharge canal and five others were recovered by trawl. One hundred Atlantic menhaden were measured which ranged from 165 to 300 mm (mean = 218 mm). Other species were affected minimally and included the American shad (1 dead), sheepshead minnow (1 dead), conger eel (1 dead), fourspine stickleback (several stressed), bay anchovy (1 stressed), and sand shrimp (some stressed and dead; about 20% of all observed). White perch and winter flounder taken by trawl in the discharge canal were in good condition and exhibited no unusual behavior. Killifishes, silversides, and the fourspine stickleback collected by trawl in lagoons adjoining Oyster Creek were relatively common and also appeared to be in good condition.

The discharge of heated water resumed on 19 January and was next halted on 26 March. The condenser discharge temperature decreased from 24.4 to 10.0 C, but no dead or stressed organisms were observed during this shutdown.

LIFE HISTORY STUDIES

Ferdinand Metzger, Jr.

Introduction

Life history studies of 13 species designated as important by the NRC and EPA began in September of 1975. Beginning in November 1977, only lengths were recorded from a representative sample of important species at each of the four stations sampled in the Bay (Fig. 1). The following is a summary of the data collected from September 1978 through March 1979. The total number of each species collected and length data were examined and compared with the distribution, abundance, and length frequencies reported during previous life history studies in Barnegat Bay (Tatham et al. 1977a, 1978a; Metzger 1979).

Materials and Methods

All individuals or a representative subsample of at least 50 specimens of the important species taken by seines and trawl were measured during the day at each station and again at night at the mouth of Oyster Creek and Forked River. The length of all fishes (nearest 1 mm) was measured from the snout to the distal portion of the central rays of the caudal fin. The distance between the ends of the anterolateral spines of the carapace of the blue crab and the length from the anterior end of the spine on the antennal scale to the posterior tip of the telson of the sand shrimp were determined to the nearest 1 mm. Sand shrimp taken by 45.7-m seine were

not measured as this gear was selective and took only the largest individuals. All data were compiled and analyzed with a Hewlett-Packard 9830A programmable calculator.

Results and Discussion

Atlantic menhaden

The Atlantic menhaden is a seasonal resident of Barnegat Bay that is most common during spring and summer (Kurtz 1978a, Metzger 1979). From September 1978 through March 1979, only two Atlantic menhaden were collected (Table 21). These were taken in Oyster Creek in December and were 175 and 205 mm in length. Although most Atlantic menhaden migrate from the Bay in fall, many individuals are attracted to the OCGS heated discharge and remain in Oyster Creek during winter (Danila 1978a). However, OCGS was shut down September through early December 1978 and fewer Atlantic menhaden were attracted to Oyster Creek during the winter of 1978-79.

Bay anchovy

The bay anchovy is a seasonal resident of Barnegat Bay that is most numerous from April to December (Kurtz 1978b). They spawn in the Bay from June through August and most fish larger than 35 mm are mature (Kurtz 1978b).

A total of 926 bay anchovy was measured at the four stations in the Bay from September through March (Table 22). Most (97.3%) bay anchovy were taken from September through November. Only 26 specimens were measured after November, and 19 of these were taken in December at the mouth of Oyster Creek.

The abundance and temporal distribution of the bay anchovy among the four stations was similar to past studies in Barnegat Bay (Kurtz 1978b,

Metzger 1979). Length-frequencies of fish taken at the four stations were similar and monthly mean lengths ranged from 33 to 62 mm.

Atlantic silverside

The Atlantic silverside is a year-round resident of Barnegat Bay that is most common from early spring to late fall. It is rarely taken in January and February (Hoch 1978a). Some 1,150 Atlantic silverside were measured at the four stations from September through March (Table 23). The 430 fish at Oyster Creek ranged in length from 30 to 145 mm and had a mean length of 78 mm. Fish from the other three stations included 344 from Forked River that ranged from 35 to 137 mm (mean length of 76 mm), 210 from Double Creek (41 to 122 mm, mean of 75 mm) and 166 from Cedar Creek (41 to 106 mm, mean of 75 mm). Few Atlantic silverside were collected after December at these three stations, but 166 specimens were taken at Oyster Creek from January through March.

The number and mean length of Atlantic silverside collected by area was similar to that found by Hoch (1977a) during 1976-77 and Metzger (1979) during 1977-78. More specimens were taken at the mouth of Oyster Creek and the distribution of fish among the other three stations was similar. The Atlantic silverside was taken in all months only at Oyster Creek.

Threespine stickleback

The threespine stickleback is a seasonal resident of Barnegat Bay that was less common recently than in past years (Boyle 1978a, Metzger 1979). It utilizes the Bay for spawning and as a nursery area. During 1977-78, only six threespine stickleback were collected in Barnegat Bay and all but

one were taken at the mouth of Forked River (Metzger 1979). From September 1978 through March 1979, only nine specimens were taken in the Bay; all were adults collected in March (Table 24). Five of the nine specimens were taken at the mouth of Forked River, two at Oyster Creek, and one each at Cedar Creek and Double Creek. They ranged in length from 57 to 65 mm.

Northern pipefish

The northern pipefish is a year-round resident of Barnegat Bay that inhabits areas of eelgrass and other vegetation. A total of 248 specimens was measured from September through March (Table 25). Most were taken from September through November and only 29 were collected thereafter. The 103 northern pipefish taken at the mouth of Forked River ranged in length from 58 to 222 mm with a mean length of 150 mm, 92 at Double Creek ranged from 59 to 198 mm (156 mm), 29 at Oyster Creek were from 103 to 205 mm (157 mm), and 24 at Cedar Creek were from 100 to 210 mm (140 mm). Moore (1978a) reported that during 1976-77 most northern pipefish in Barnegat Bay were taken from April through October with few caught after November. During 1977-78, most were collected from April through August (Metzger 1979). During the colder winter months the northern pipefish leaves shallow areas and thus is less susceptible to capture.

Striped bass

Although the striped bass is important to the sport and commercial fishery in New Jersey, few have been taken by fishermen during recent years in Barnegat Bay. On rare occasions, striped bass have been observed in the OCGS heated discharge in spring and fall (Metzger 1979). Boyle (1978b)

examined seven striped bass collected in the Bay during 1976-77; only one specimen was taken in 1977-78. No striped bass were collected from September 1978 through March 1979.

Bluefish

Young and juvenile bluefish are seasonal residents of Barnegat Bay from spring through early fall and utilize the area as a nursery. Only a total of eight bluefish were taken at the four stations in September and October (Table 26). All fish were probably young (age 0+) and ranged in length from 120 to 201 mm. Some 387 bluefish were taken from the same areas in 1977-78 and all but one specimen were young (Metzger 1978a). Most young bluefish emigrate from the Bay in September and, therefore, few specimens were present during most of the sampling period.

Weakfish

Young weakfish are seasonal residents of Barnegat Bay from spring until fall and utilize the Bay as a nursery. Adults are occasionally taken during the same period. From September to November, 90 weakfish were measured (Table 27); none were taken after November. Most (n=68) were taken at Forked River, and they ranged in length from 38 to 139 mm with a mean length of 90 mm. Twenty-two specimens were taken from the other three stations: 17 at Oyster Creek (65 to 220 mm, mean of 136 mm), 4 at Double Creek (71 to 130 mm, mean of 101 mm) and 1 at Cedar Creek (74 mm).

The distribution of weakfish among the four stations during the present study was very similar to that found during 1977-78 in the same areas. Most fish taken during both years were collected at the mouth of Forked River and few were taken at Cedar Creek and Double Creek. The age composition of

weakfish was similar to past studies (Hoch 1978b, Metzger 1979) in that most fish were young.

Northern kingfish

The northern kingfish is primarily a summer resident present from May through October. Only 11 northern kingfish were collected in the Bay, and all were taken in September at Forked River and Oyster Creek (Table 28). Eight specimens taken at Forked River ranged in length from 112 to 136 mm and had a mean length of 125 mm. The three fish at Oyster Creek ranged from 133 to 158 mm (mean of 144 mm). All fish collected were probably young based on growth rates for the species reported by Schaeffer (1965). From September 1977 through August 1978, 16 northern kingfish were collected in the Bay and like the present study, all were young and were taken mostly at the mouth of Forked River (Metzger 1979).

Summer flounder

The summer flounder enters bays and rivers during late spring and summer and is usually found in Barnegat Bay from April to November (Metzger 1978b). Only two summer flounder were collected in 1978-79, one each in September and October at Cedar Creek (Table 29). They were 240 and 250 mm in length and were probably age 1+. During the previous year only five specimens were collected in the Bay, three at Forked River and two at Oyster Creek. They were ages 0+ and 1+. Western Barnegat Bay has primarily a muddy bottom, which is not a preferred habitat for the summer flounder.

Winter flounder

The winter flounder is year-round resident of Barnegat Bay. Most adults are taken between November and April and young are common during the summer. A total of 311 winter flounder was measured at the four stations from September through March (Table 30). Most specimens were young. The 150 fish taken at Oyster Creek ranged in length from 64 to 339 mm and had a mean length of 126 mm. Specimens (n=124) taken at Forked River ranged in length from 62 to 393 mm (mean of 134 mm), while the 26 at Double Creek were 66 to 321 mm (148 mm), and the 11 at Cedar Creek were 63 to 315 mm (160 mm).

Northern puffer

The northern puffer is found in Barnegat Bay primarily from spring through early fall. Fifteen specimens taken at Forked River in September ranged in length from 89 to 128 mm and had a mean length of 107 mm (Table 31). One northern puffer was taken at Oyster Creek (120 mm) and one at Double Creek (140 mm). These specimens were probably young, based on lengths reported by Moore (1978b).

Sand shrimp

The sand shrimp is one of the most common macroinvertebrates found in Barnegat Bay and is present throughout the year. A total of 2,352 sand shrimp was measured from September through March and specimens ranged from 12 to 67 mm (Table 32). The range of lengths and mean lengths for specimens found at the four stations were similar. The temporal and spatial distribution of sand shrimp was similar to previous studies in the Bay (Moore 1978c, Metzger 1979).

Blue crab

The blue crab is resident in Barnegat Bay throughout the year but is active usually only from March through early December. Blue crab taken from September through March ranged in length from 5 to 188 mm. Monthly mean lengths were largest at Cedar Creek and Double Creek in the fall (Table 33). The blue crab was taken in all months sampled at Forked River and in all months except January in Oyster Creek, but was not taken after December at Double Creek and Cedar Creek.

Since 1976, blue crab taken in Barnegat Bay were divided into three size categories for comparison of the age-class structure of the population sampled each year. The categories were classified as 1) recruitment (≤59 mm), 2) growth (60-110 mm), and 3) mature (≥120 mm) blue crab (Miller et al. 1975). Fewer recruitment-size blue crab were taken in 1977 than in 1976 and this was attributed to heavy mortality during the severe winter of 1976-77 (Metzger 1978c). Recruitment-size blue crab comprised 57% of the population during 1977-78 and this was indicative of the recovery of the population (Metzger 1979). During the present study, recruitment-size blue crabs have remained common (61%).

ENTRAINMENT OF ORGANISMS THROUGH THE COOLING-WATER SYSTEM

Felicia C. Miller and Kenneth A. Tighe

Introduction

Planktonic organisms, because of their relatively small size, pass through the mesh of the traveling-water screens in front of the intake to the OCGS circulating-water pumps and travel through the cooling-water system. During this entrainment, organisms are subjected to mechanical, thermal, hydraulic, and chemical stresses.

The entrainment studies reported here are a continuation of studies conducted from September 1975 through August 1978 (Sandine et al. 1977, 1978; Miller and Tighe 1979) which included the species composition and abundance of macrozooplankton (planktonic invertebrates >500 microns in length), and ichthyoplankton.

Materials and Methods

Samples were taken once a week starting 2 h after sunset (Period 3A) because greater densities of plankton are generally collected at night (Bridger 1956; Johnson 1957; Tatham et al. 1977b, 1978; Miller and Tighe 1979). Collections were also taken once a month during four periods over a 24-h interval. Period 1 was from 2 h after sunrise to 6 h before sunset, period 2 was from 6 h before sunset to sunset, period 3A was from 2 to 6 h after sunset, and period 4 was from 6 h before sunrise to sunrise.

Samples were taken with a 36-cm bongo sampler (505-micron mesh) to determine the species composition and abundance of macrozoo- and ichthyoplankton entrained at OCGS. Collections were taken at the intake (Sta. 7) and discharge (11) of the circulating-water system (Fig. 2). The tow at the discharge was made 1 to 5 min after the tow at the intake to sample the same water mass after it circulated through the OCGS cooling-water system. Sampling the same water mass was an attempt to reduce the large sampling variability associated with the patchy distributions typical of plankton populations.

The sampling gear was attached to a wire approximately 30 to 38 cm above a 27-kg weight, and it was deployed and retrieved with a hand winch mounted on a boom. Two consecutive oblique tows were taken at each station and each tow sampled the entire water column at least once. Tow duration was usually from 1 to 5 min, depending upon detrital levels and abundance of organisms. Because of the substantially greater current flow at the discharge, the tow duration at the discharge was approximately half that of the intake in order to sample a comparable volume of water. The volume of water sampled was determined with a digital flowmeter (General Oceanics Model 2030) centered in the mouth of one side of the sampler at the discharge and in the mouth of each side of the sampler used at the intake. Current flow variation (i.e., eddies) at the intake resulted in differences in the volume filtered by the two sides of the sampler at this station. Although both sides of the bongo sampler were metered separately in collections at the intake, samples from the right and left sides were combined to make a single collection. Densities were

then calculated using a average of the two volume-filtered estimates.

When the nets were removed from the water, they were gently rinsed with either low pressure water from a pump or with water poured from buckets. Samples were preserved in the field using a 5% formalin (2% formaldehyde) solution buffered with sodium borate. However, when ctenophores were abundant, they were counted and identified before preservation because ctenophores disintegrated in formalin. All other macrozooplankton and all ichthyoplankton were identified in the laboratory at a later date. Most ichthyoplankton were identified to the species level with the exception of larval gobies, blennies, and silversides; these fishes cannot be identified to species until the juvenile stage. All anchovy larvae were classified as bay anchovy since no striped anchovy eggs were found in plankton collections and adult striped anchovy were rarely taken in the Bay. For collections made at the intake, all amphipods, mysids, and mud crab zoeae were grouped into their respective families. All forms were identified to species from collections taken at the discharge.

The number of a form entrained at OCGS was estimated using stratified sampling with optimal allocation (Snedecor and Cochran 1967). The mean number entrained per hour for the year ($\bar{Y}_{st}$) was estimated by the formula:

$$\bar{Y}_{st} = \frac{\sum(N_p \cdot \bar{Y}_p)}{N}$$

N_p = number of sampling units in stratum p.

$\bar{Y}_p$ = mean density of a form in stratum p.

N = number of sampling units in all strata.

The strata used were day and night. A sample was the mean density of all the individual tows collected in a stratum multiplied by the volume of water pumped through OCGS in 1 h on the sampling date. Each sampling unit was 1 h, and each sample was expressed as the number of a form entrained per hour because the duration of the individual tows was unequal. The total number entrained during the year (E) was estimated by the formula:

$$E = \bar{Y}_{st} \cdot D \cdot 24\ h$$

D = number of days the OCGS circulating-water pumps operated during the year.

Only the density of forms at the discharge was used in calculating E for macrozooplankton (with the exception of ctenophores) and ichthyoplankton collected. Samples from the intake were not used because of the variation in the volume filtered between the two sides of the bongo sampler. However, since ctenophores are easily fragmented during passage through the circulating-water system, the total number of ctenophores entrained during the year was estimated using intake collections.

Immediate mortality determinations were conducted only when selected ichthyoplankton (e.g., winter flounder) were abundant enough to allow examination of a substantial number of individuals. Samples were taken with an expansion cone mortality sampler of original design (Fig. 4). This sampler had a mouth opening of 20-cm expanded to a 36-cm base. It was fitted with a 333-micron mesh cylinder-cone nylon net, and a 500-ml plastic cup with a window of 250-micron netting was attached as a codend. The collection techniques employed for these samples were somewhat different than techniques employed during regular sampling. These differences were

intended to reduce various stresses that may have affected mortality estimates. The sampler was deployed similarly to that reported for bongo collections, although the intake and discharge stations were not sampled simultaneously. The net was thoroughly rinsed before each tow to prevent contamination of the sample by the previous tow. To further reduce collection stress and the amount of detritus in the sample, tow duration was reduced to 1 min or less and the codend was not rinsed. The sample was immediately taken to a nearby trailer where the condition of organisms was determined.

For determination of the immediate condition of larval and juvenile fish, the sample was poured into a glass pan placed in a water bath. This maintained the organisms near (± 1C) the collection temperature. Live, dead, and damaged larvae were separately preserved; measurements and enumerations were made at a later date. Specimens were considered live if normal mobility was exhibited, dead if no movement was observed, and damaged if they exhibited abnormal behavioral patterns (e.g., swimming on their sides) but showed other vital functions (e.g., respiration, muscular spasms). A minimum of 25 specimens of each species per station was required in order to use the binomial proportion test (Snedecor and Cochran 1967) to determine significant differences in mortality between individuals collected at the intake and discharge. Collections were taken until at least 25 specimens were examined at each station or until a total of 10 tows was taken at each station.

Results and Discussion

Macrozooplankton

A total of 128 macrozooplantkon collections was taken at the intake

(Sta. 7) and discharge (11) to the OCGS circulating-water system from 1 September 1978 through 31 March 1979 (Appendix Table 11). In comparison with the previous year, fewer collections were taken during the 7-month period because little or no water was circulated by OCGS during a shutdown from 16 September through 4 December. When water is not circulated through OCGS during shutdowns, the dilution discharge is usually sampled instead of the cooling-water intake and discharge. However, no collections were taken at the dilution discharge during this period because the dilution pump at Sta. 13 was shut down for maintenance. In addition, regular entrainment collections were not taken at the intake on 8 and 14 February when extremely cold air and water temperatures caused nets and flowmeters to freeze. Because of the stratification and irregular flow of water in front of the intake, the relative abundance and species composition of most zooplankton reported herein were based primarily on 66 collections taken at the discharge in September and from December through March.

From September through March, an estimated $7.06 \times 10^9 \pm 1.64 \times 10^9$ organisms were entrained (Table 34). This estimate was considerably lower than the number entrained ($1.93 \times 10^{10} \pm 1.97 \times 10^9$) during the same 7-month period in 1977-78 due to the OCGS shutdown and to lower overall macrozooplankton densities in each month of 1978-79. Mean monthly macrozooplankton densities at the condenser discharge ranged from $16.2/m^3$ in September to $35.9/m^3$ in March and averaged $21.7/m^3$ (Table 35). During the previous year, the mean monthly density for the 5 comparable months of OCGS operation was $35.0/m^3$ (Smith and Swiecicki 1979).

Some 26 taxa represented 95% (by density) of all macrozooplankton (Tables 36 and 37). Among the most numerous organisms were mysids (32.8%), amphipods (19.6%) and hydromedusae (13.3%). These forms are typical of the fall and winter macrozooplankton community in Barnegat Bay (Sandine et al. 1977, 1978; Miller and Tighe 1979).

Neomysis americana comprised most (98.5%) of the mysids collected at the discharge and occurred in almost every sample (95.5%). Densities of N. americana were consistently greater at night than during the day which reflected its diel vertical migration behavior (Table 38). Therefore, most of the estimated 2.31×10^9 specimens of N. americana were entrained at night. The mean monthly densities of N. americana ranged from $3.1/m^3$ in September to $12.7/m^3$ in January and averaged $7.0/m^3$ for the 5 months sampled. Although this is the lowest mean density recorded for this period since sampling began in 1975, the relative abundance of N. americana (32.3% of all macrozooplankton) was comparable to that found in 1976-77 (35.3%) and 1977-78 (33.4%) for the 5 months (Sandine et al. 1978, Miller and Tighe 1979).

The hydrozoan Sarsia spp. was the second most abundant macrozooplankter and an estimated 8.96×10^8 medusae were entrained. As in past years, Sarsia was first collected in mid-February when the water temperature was almost 0 C. Substantial numbers, however, were not collected until March; greatest densities were found at water temperatures of 10 and 11 C. Sarsia spp. averaged $2.9/m^3$ for the study period and accounted for 13.1% of all macrozooplankton.

Zoeae of the sand shrimp were collected from December through March and an estimated 5.57×10^8 larvae were entrained. They averaged $1.7/m^3$, comprised 8.0% of all macrozooplankton, and ranked third in overall abundance. Most of the larval sand shrimp were stage I zoeae (Sandifer 1972). However, when the water temperature reached 9.0 C during the last week of March, densities of larvae increased from less than $3.0/m^3$ to greater than $20.0/m^3$ and almost 10% of all larvae taken were stage II zoeae. The abrupt increase in densities indicated that the major spring spawn of sand shrimp had commenced.

An estimated 1.42×10^9 amphipods were entrained. Nine taxa were collected frequently and in small numbers during the fall and winter; these were Ampelisca spp., Gammarus spp., Microdeutopus gryllotalpa, Jassa falcata, Stenothoidae, Caprellidea, Melita nitida, Corophium tuberculatum, and Elasmopus levis.

With the exception of Gammarus spp., most of these amphipods have been relatively common in the previous years of study. In February, substantial numbers of large, gravid Gammarus annulatus were collected. This species is usually found in relatively high salinities such as in the surf zone or in open coastal areas (Bousfield 1973). G. annulatus occurred in late February during a period of extreme tidal fluctuation and strong winds which indicated that considerable exchange of water probably took place between Barnegat Bay and the ocean. In subsequent collections many recently released young of Gammarus spp. were collected which were probably G. annulatus.

An estimated 3.04×10^8 specimens of the arrowworm Sagitta spp. were entrained. They were found from December through March and accounted for

4.9% of all macrozooplankton. Most of the arrowworms consisted of S. elegans which is primarily a cold-water, neritic species and the most common species of Sagitta found along the coast of the eastern North Atlantic (Grant 1963). Mean monthly densities ranged from $0.05/m^3$ to $4.77/m^3$ and averaged $1.1/m^3$ for the study period.

The cumaceans, Leucon americanus, Oxyurostylis smithi, and Cyclaspis varians were collected frequently and in small numbers. The most common cumacean, L. americanus, was found in 72.0% of all collections and an estimated 2.01×10^8 specimens were entrained. Mean monthly densities ranged from $0.07/m^3$ to $1.41/m^3$ and averaged $0.64/m^3$ (2.9% of all macrozooplankton). O. smithi and C. varians were taken less frequently and in considerably lower densities (mean denstiy of $0.18/m^3$ and $0.08/m^3$, respectively).

An estimated 1.84×10^8 polychaete larvae were entrained and they were the ninth most abundant form. Polychaete larvae were scarce in the fall and winter; monthly densities ranged from $0.01/m^3$ to $1.02/m^3$ and averaged $0.53/m^3$. During the last week in March, however, densities greater than $40/m^3$ were found at the intake at a water temperature of 9 C. Water temperatures of 7 to 9 C usually initiate polychaete reproductive activity in Barnegat Bay (Tatham et al. 1978b).

An estimated 5.02×10^8 specimens of the ctenophore Mnemiopsis leidyi were entrained. In previous years, M. leidyi was usually taken from July to September or October. However, possibly because of warm water temperatures in the fall, M. leidyi was collected until the end of January. Densities were greatest in September ($7.4/m^3$) and then decreased as the water temperature decreased.

Ichthyoplankton

Ichthyoplankton were enumerated from the 128 bongo collections taken at the OCGS intake (Sta. 7) and discharge (Sta. 11) during September 1978 and from December 1978 through March 1979 (Appendix Table 12). Sampling was not conducted during October and November due to the shutdown of OCGS and the inability to sample the dilution discharge. The following account is based solely on the 66 collections taken at the discharge due to possible bias in density estimates at the intake caused by the aforementioned irregular flow of water there.

The species composition and abundance of ichthyoplankton from September 1978 through March 1979 (Tables 39 and 40) were similar to the same period during the previous 3 years (Sandine et al. 1977, 1978; Miller and Tighe 1979). Some $1.66 \times 10^9 \pm 1.29 \times 10^9$ eggs and $1.61 \times 10^9 \pm 5.39 \times 10^8$ larvae and juveniles were estimated entrained during the 5 months OCGS was in operation (Table 41).

During September, the ichthyoplankton was dominated by larvae and juveniles of the bay anchovy (Table 40). An estimated 8.37×10^7 were entrained during the period (Table 41). Bay anchovy larvae occurred in 22.7% of the samples and comprised 5.0% of the larvae and juveniles collected with a mean density of 231/1000 m^3 for the period (Table 39). Juvenile bay anchovy were less common (0.6% of the larvae and juveniles, 26/1000 m^3). These and the other forms taken in September were produced during the summer spawning season. The density of juvenile bay anchovy probably would have been greater if sampling had been conducted in October and November since the juveniles are usually dominant during those months (Sandine et al. 1978, Miller and Tighe 1979).

The winter-early spring ichthyoplankton appeared in December and was dominated by larvae of the sand lance (monthly mean density of 4637/1000 m^3) through January (6323/1000 m^3) and February (3233/1000 m^3). By March its densities began to decline (632/1000 m^3). Larval sand lance dominated during the collection period (64.5% of all larvae and juveniles, mean density of 2965/1000 m^3) and occurred in 72.7% of the samples. The number of sand lance larvae entrained has increased each year from 3.42×10^7 in 1975-76 to 1.26×10^8 in 1976-77 (Sandine et al. 1978), and to 1.53×10^8 in 1977-78 (Miller and Tighe 1979). The estimated number of sand lance larvae entrained in 1978-79 was 1.03×10^9 (Table 41). This increase in entrainment may be attributed in part to a significant increase in abundance of sand lance along the Atlantic coast since 1975 (Meyer et al. 1979).

Other ichthyoplankton that were dominant during the winter-early spring period of abundance included the eggs and larvae of the winter flounder and unidentified fish eggs. Larval winter flounder were the second most abundant larvae (28.6%, 1315/1000 m^3) and occurred in 27.3% of the collections. They were first collected in small numbers during February (monthly mean density of 25/1000 m^3) and were abundant during March (5648/1000 m^3). The estimated number of winter flounder larvae entrained during this period was 4.72×10^8. This is similar to the 4.13×10^8 estimated to have been entrained in 1977-78 (Miller and Tighe 1979). Both estimates were less than the 1.22×10^9 entrained in 1976-77 (Sandine et al. 1978).

Eggs of the winter flounder were the dominant fish egg collected during the entire period (92.8% of the eggs collected, mean density of

3693/1000 m^3) and they occurred in about half of the samples. Winter flounder eggs were first taken in January (monthly mean density of 1171/1000 m^3), reached maximum abundance in February (9982/1000 m^3), and were still present in high densities in March (7312/1000 m^3). Due to the demersal nature of winter flounder eggs, those eggs entrained probably represented a small portion of the total number spawned in the Bay.

Unidentified eggs were second in abundance during the collection period (6.6%, 262/1000 m^3) and occurred in about a third of the samples. Unidentified eggs were most abundant during January (723/1000 m^3), and decreased in abundance during February (429/1000 m^3) and March (155/1000 m^3). Most of the unidentified fish eggs found were probably winter flounder eggs that could not be definitely identified. This could explain the decrease in density of unidentified eggs from month to month because winter flounder eggs in later stages of development can be more easily identified.

The few other eggs collected and identified during the 5 months of sampling included those of the bay anchovy and sand lance. No eggs were collected in December.

Elvers of the American eel were common from January through March and appeared in 28.8% of the collections. They made up 0.7% of the larvae and juveniles taken and had a mean density of 32/1000 m^3 for the period. An estimated 1.20×10^7 were entrained.

Other ichthyoplankton collected during the period included a few larval blennies, Atlantic cod, gobies, rock gunnel, and summer flounder, and juvenile northern pipefish and Atlantic menhaden.

Mean densities of the different ichthyoplankton forms were calculated for day and night during each month (Table 42). Comparisons were confounded

by the larger number of night collections, but two patterns of abundance were evident. Most forms exhibited greater densities at night and included winter flounder eggs and larvae, American eel elvers, and bay anchovy juveniles. The greater abundance of eggs at night was probably due to increased nightime spawning activity. Larvae and juveniles were more abundant at night probably because of changes in their vertical distribution or decreased net avoidance. There was no difference between the day and night densities of larval sand lance. These results were similar to those reported for the previous 3 years (Sandine et al. 1977, 1978; Miller and Tighe 1979).

Mortality studies were conducted in March and April (Table 43). Samples taken at the discharge were divided into those taken when the plant was operating and those taken when the plant was shut down. This enabled an examination of the mechanical effects of entrainment separately from the combined mechanical-thermal effects. For winter flounder larvae in March, the mortality at the intake (14%) was significantly lower than at the discharge under either an operating or shutdown condition (55% and 24%, respectively). However, the difference between the intake and discharge when the plant was operating was much greater than the difference between the intake and discharge when the plant was shut down. Also, the immediate mortality rate at the discharge with the plant operating (55%) was significantly greater than at the discharge with the plant shut down (24%). This indicates that mechanical effects alone have much less impact on immediate mortality than combined mechanical and thermal effects. In April, insufficient numbers of larvae were collected and statistical tests could not be run. However, examination of the data shows that the percent mortality for intake (17%) was essentially the same as that for the discharge

(18%) when the plant was shut down. This indicates that mechanical effects probably have little impact on larger winter flounder and most immediate mortality of large larvae can be attributed to the combined effects of mechanical and thermal stresses.

For larvae of the sand lance, statistical comparisons were made for the total number of larvae collected during both March and April since insufficient larvae (<25) were collected during March and during the period in April when the plant was shut down. By combining both months, sufficient larvae for statistical comparisons were taken at the intake and at the discharge under both operating and shutdown conditions. The mortality rate at the intake (12%) was significantly lower than at the discharge under either an operating or shutdown condition (72% and 38%, respectively). Also, the immediate mortality rate at the discharge with OCGS operating (72%) was significantly greater than at the discharge when it was shut down (38%). This was similar to the findings with winter flounder larvae and indicated that mechanical effects alone had less impact on immediate mortality than combined mechanical and thermal effects. It is impossible to determine the impact of thermal effects alone from this data since both mechanical and thermal stresses probably acted to produce the observed mortalities when OCGS was in operation.

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Table 1. Alphabetical listing by common name of all vertebrates collected by fish and impingement programs from September 1978 through March 1979.

Alewife - Alosa pseudoharengus
American eel - Anguilla rostrata
American shad - Alosa sapidissima
Atlantic croaker - Micropogon undulatus
Atlantic herring - Clupea harengus
Atlantic menhaden - Brevoortia tyrannus
Atlantic needlefish - Strongylura marina
Atlantic silverside - Menidia menidia
Banded killifish - Fundulus diaphanus
Bay anchovy - Anchoa mitchilli
Black drum - Pogonias cromis
Black sea bass - Centropristis striata
Blueback herring - Alosa aestivalis
Bluefish - Pomatomus saltatrix
Blunmose stingray - Dasystis sayi
Butterfish - Peprilus triacanthus
Chain pickerel - Esox niger
Conger eel - Conger oceanicus
Crevalle jack - Caranx hippos
Cunner - Tautogolabrus adspersus
Feather blenny - Hypsoblennius hentzi
Fourspine stickleback - Apeltes quadracus
Golden shiner - Notemigonus crysoleucas
Grubby - Myoxocephalus aenaeus
Hogchoker - Trinectes maculatus
Inshore lizardfish - Synodus foetens
Leopard frog- Rana pipiens
Lined seahorse - Hippocampus erectus
Longhorn sculpin - Myoxocephalus octodecemspinosus
Lookdown - Selene vomer
Mud sunfish - Acantharcus pomotis
Mummichog - Fundulus heteroclitus
Naked goby - Gobiosoma bosci
Northern kingfish - Menticirrhus saxatilis
Northern pipefish - Syngnathus fuscus
Northern puffer - Sphoeroides maculatus
Northern searobin - Prionotus carolinus
Northern sennet - Sphyraena borealis
Northern stargazer - Astroscopus guttatus
Opossum pipefish - Oostethus lineatus
Oyster toadfish - Opsanus tau
Permit - Trachinotus falcatus
Pumpkinseed - Lepomis gibbosus
Rainwater killifish - Lucania parva
Red hake - Urophycis chuss
Sand lance - Ammodytes sp.
Scup - Stenotomus chrysops
Seaboard goby - Gobiosoma ginsburgi
Sheepshead minnow - Cyprinodon variegatus
Silver hake - Merluccius bilinearis
Silver perch - Bairdiella chrysura
Smallmouth flounder - Etropus microstomus
Spot - Leiostomus xanthurus
Spotfin butterflyfish - Chaetodon ocellatus
Spotted hake - Urophycis regius
Striped anchovy - Anchoa hepsetus
Striped blenny - Chasmodes bosquianus
Striped cusk-eel - Rissola marginata
Striped killifish - Fundus majalis
Striped searobin - Prionotus evolans
Summer flounder - Paralichthys dentatus
Tautog - Tautoga onitis
Threespine stickleback - Gasterosteus aculeatus
Tidewater silverside - Menidia beryllina
Weakfish - Cynoscion regalis
White mullet - Mugil curema
White perch - Morone americana
Windowpane - Scophthalmus aquosus
Winter flounder - Pseudopleuronectes americanus

Table 2. Alphabetical listing by scientific name of all vertebrates collected by fish and impingement programs from September 1978 through March 1979.

Acantharcus pomotis - Mud sunfish
Alosa aestivalis - Blueback herring
Alosa pseudoharengus - Alewife
Alosa sapidissima - American shad
Ammodytes sp. - Sand lance
Anchoa hepsetus - Striped anchovy
Anchoa mitchilli - Bay anchovy
Anguilla rostrata - American eel
Apeltes quadracus - Fourspine stickleback
Astroscopus guttatus - Northern stargazer
Bairdiella chrysura - Silver perch
Brevoortia tyrannus - Atlantic menhaden
Caranx hippos - Crevalle jack
Centropristis striata - Black sea bass
Chaetodon ocellatus - Spotfin butterflyfish
Chasmodes bosquianus - Striped blenny
Clupea harengus - Atlantic herring
Conger oceanicus - Conger eel
Cynoscion regalis - Weakfish
Cyprinodon variegatus - Sheepshead minnow
Dasyatis sayi - Bluntnose stingray
Esox niger - Chain pickerel
Etropus microstomus - Smallmouth flounder
Fundulus diaphanus - Banded killifish
Fundulus heteroclitus - Mummichog
Fundulus majalis - Striped killifish
Gasterosteus aculeatus - Threespine stickleback
Gobiosoma bosci - Naked goby
Gobiosoma ginsburgi - Seaboard goby
Hippocampus erectus - Lined seahorse
Hypsoblennius hentzi - Feather blenny
Leiostomus xanthurus - Spot
Lepomis gibbosus - Pumpkinseed
Lucania parva - Rainwater killifish
Menidia beryllina - Tidewater silverside
Menidia menidia - Atlantic silverside
Menticirrhus saxatilis - Northern kingfish
Merluccius bilinearis - Silver hake
Micropogon undulatus - Atlantic croaker
Morone americana - White perch
Mugil curema - White mullet
Myoxocephalus aenaeus - Grubby
Myoxocephalus octodecemspinosus - Longhorn sculpin
Notemigonus crysoleucas - Golden shiner
Oostethus lineatus - Opossum pipefish
Opsanus tau - Oyster toadfish
Paralichthys dentatus - Summer flounder
Peprilus triacanthus - Butterfish
Pogonias cromis - Black drum
Pomatomus saltatrix - Bluefish
Prionotus carolinus - Northern searobin
Prionotus evolans - Striped searobin
Pseudopleuronectes americanus - Winter flounder
Rana pipiens - Leopard frog
Rissola marginata - Striped cusk-eel
Scophthalmus aquosus - Windowpane
Selene vomer - Lookdown
Sphoeroides maculatus - Northern puffer
Sphyraena borealis - Northern sennet
Stenotomus chrysops - Scup
Strongylura marina - Atlantic needlefish
Syngnathus fuscus - Northern pipefish
Synodus foetens - Inshore lizardfish
Tautoga onitis - Tautog
Tautogolabrus adspersus - Cunner
Trachinotus falcatus - Permit
Trinectes maculatus - Hogchoker
Urophycis chuss - Red hake
Urophycis regius - Spotted hake

Table 3. Alphabetical listing by scientific name of all macroinvertebrate taxa collected by fish and impingement programs from September 1978 through March 1979.

Aequorea spp. - a hydromedusa
Asterias forbesi - a starfish
Bivalvia (class) - bivalve mollusks
Callinectes sapidus - blue crab
Callinectes similis - lesser blue crab
Cancer irroratus - rock crab
Carcinus maenus - green crab
Crangon septemspinosa - sand shrimp
Echinodermata (phylum) - spiny-skinned animals
Holothuroidea (class) - sea cucumbers
Libinia dubia - spider crab
Limulus polyphemus - horseshoe crab
Mytilus edulis - blue mussel
Nemertea (phylum) - ribbon worms
Neopanope sayi - a mud crab
Ovalipes ocellatus - a lady crab
Pagurus spp. - a hermit crab
Palaemonetes vulgaris - grass shrimp
Panopeus herbstii - a mud crab
Penaeus aztecus - brown shrimp
Polychaeta (class) - bristle worms
Portuntus gibbesi - a portunid crab
Procambarus acutus - pond crayfish

Table 4. Weekly minimum, maximum, and mean air and water temperature (C), salinity (ppt), dissolved oxygen (ppm), and pH measurements taken during impingement sampling at the Oyster Creek Generating Station from 3 September 1978 through 31 March 1979.

Week		3-9 September			10-16 September			17-23 September			19-25 November		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Temperature	air	16.4	25.5	20.2	12.0	21.8	18.0	19.2	21.0	20.1	3.0	7.3	5.2
	surface	22.1	24.5	23.3	17.9	24.3	20.4	21.3	21.8	21.5	9.4	10.0	9.6
	bottom	22.1	24.7	23.4	18.5	24.3	20.9	21.5	21.8	21.7	9.2	9.9	9.6
Salinity	surface	15.0	16.0	15.2	14.5	17.0	15.9	16.0	16.5	16.1	19.0	25.0	20.3
	bottom	15.0	16.5	15.5	14.5	17.0	15.9	16.0	16.0	16.0	20.0	21.0	20.5
Oxygen	surface	6.3	9.1	7.7	6.6	8.3	7.5	9.0	9.5	9.2	9.4	10.0	9.8
	bottom	6.1	8.8	7.6	7.0	8.4	7.5	9.0	9.5	9.2	9.7	10.0	9.9
pH	surface	7.9	8.3	8.1	7.8	8.1	7.9	7.8	8.0	7.9	7.6	7.9	7.8
	bottom	8.0	8.2	8.1	7.8	8.0	7.9	7.9	8.0	8.0	7.8	7.8	7.8

Week		26 November - 2 December			3-9 December			10-16 December			17-23 December		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Temperature	air	3.0	9.5	5.9	4.5	18.8	10.2	-6.0	0.0	-2.9	-4.5	4.0	0.7
	surface	5.1	5.8	5.6	7.4	9.6	8.5	3.2	6.8	4.5	1.6	4.2	2.9
	bottom	5.0	6.8	5.9	8.1	9.0	8.5	3.8	6.7	5.6	1.5	5.6	3.6
Salinity	surface	14.0	19.0	16.9	16.0	18.0	16.9	20.0	22.0	21.1	17.0	23.0	20.7
	bottom	19.0	20.0	19.5	16.0	20.0	17.8	18.0	21.0	19.8	17.0	23.0	20.3
Oxygen	surface	9.4	10.6	10.0	10.1	12.8	11.3	10.9	12.0	11.4	10.4	12.1	11.3
	bottom	9.4	10.5	9.9	10.0	12.0	11.4	11.3	12.2	11.7	10.9	11.9	11.4
pH	surface	7.5	7.8	7.7	7.4	8.1	7.9	8.0	8.1	8.1	7.5	8.0	7.9
	bottom	7.7	7.9	7.8	7.8	8.1	8.0	8.1	8.1	8.1	7.5	8.0	7.8

Week		24-30 December			31 December - 6 January			7-13 January			14-20 January		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Temperature	air	-9.0	-2.0	-4.7	-12.5	-5.5	-9.6	-11.0	0.8	-4.8	-13.0	-5.0	-8.4
	surface	-0.8	4.0	1.9	-0.1	2.6	1.3	-1.0	4.0	1.3	-1.8	0.8	-0.1
	bottom	1.5	4.6	2.9	-0.2	3.6	2.1	0.6	4.9	3.4	1.7	2.5	2.1
Salinity	surface	17.0	22.0	20.1	19.0	25.0	20.6	18.0	21.0	19.6	12.0	23.0	18.7
	bottom	18.0	22.0	19.5	19.0	21.0	20.3	19.0	21.0	20.0	20.0	23.0	21.0
Oxygen	surface	11.5	13.4	12.5	10.2	13.5	12.1	10.6	12.4	11.6	12.2	13.1	12.6
	bottom	11.9	13.6	12.7	10.3	13.7	11.8	10.7	12.1	11.3	12.4	12.6	12.5
pH	surface	7.5	8.1	7.9	8.0	8.2	8.1	7.8	8.2	8.0	7.6	8.2	7.9
	bottom	7.8	8.1	8.0	8.0	8.2	8.1	7.7	8.1	7.9	7.7	8.1	8.0

Week		21-27 January			28 January - 3 February			4-10 February			11-17 February		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Temperature	air	-4.0	2.0	-0.5	-5.0	3.5	-1.1	-11.5	-6.0	-9.1	-15.5	-6.0	-8.6
	surface	1.2	4.6	2.7	-0.2	3.5	1.9	-1.3	0.0	-0.8	-0.8	1.5	-0.0
	bottom	1.8	5.8	3.4	1.4	4.0	2.7	-0.2	1.0	0.6	-0.3	0.7	0.3
Salinity	surface	20.0	22.0	20.5	16.0	22.0	19.5	1.9	24.0	18.6	17.0	19.0	17.9
	bottom	20.0	22.0	20.5	18.0	22.0	19.8	18.0	24.0	20.3	16.0	18.0	17.3
Oxygen	surface	10.7	12.0	11.3	11.9	14.0	13.3	10.1	14.0	11.8	11.6	14.4	12.8
	bottom	10.7	11.8	11.2	12.6	14.0	13.4	10.1	12.3	11.4	11.8	12.7	12.3
pH	surface	7.7	8.2	8.0	7.8	8.1	8.0	7.6	8.3	8.0	8.0	8.2	8.1
	bottom	7.8	8.0	8.0	7.6	8.2	7.9	8.0	8.1	8.0	8.0	8.2	8.1

Table 4. (cont.)

Week		18-24 February			25 February - 3 March			4-10 March			11-17 March		
		Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Temperature	air	-0.5	1.2	0.6	-1.0	3.0	1.6	-1.0	10.5	4.8	-8.2	3.0	-3.4
	surface	0.5	1.6	1.2	0.8	3.8	2.0	6.2	7.8	7.2	2.5	5.6	3.9
	bottom	1.8	1.8	1.8	2.4	2.4	2.4	-	-	-	-	-	-
Salinity	surface	17.5	20.0	18.9	11.0	19.0	16.7	8.0	12.0	10.3	8.0	10.5	9.3
	bottom	18.0	20.0	18.9	19.0	19.0	19.0	-	-	-	-	-	-
Oxygen	surface	12.3	13.6	12.8	11.7	13.9	12.8	11.7	12.6	12.2	11.4	12.9	12.2
	bottom	12.3	13.2	12.8	13.8	13.9	13.9	-	-	-	-	-	-
pH	surface	7.7	7.8	7.8	7.2	7.7	7.5	7.3	8.0	7.9	7.5	8.2	7.9
	bottom	7.8	7.8	7.8	7.7	7.7	7.7	-	-	-	-	-	-

Week		18-24 March			25-31 March		
		Min	Max	Mean	Min	Max	Mean
Temperature	air	1.5	11.0	5.4	-2.0	11.0	5.0
	surface	5.6	11.8	8.4	6.7	10.4	9.0
	bottom	-	-	-	8.5	10.9	9.6
Salinity	surface	12.0	14.0	12.6	9.0	16.0	12.3
	bottom	-	-	-	10.5	18.0	15.4
Oxygen	surface	10.2	10.9	10.4	9.4	10.8	10.0
	bottom	-	-	-	9.0	10.2	9.8
pH	surface	7.7	8.3	8.1	7.6	8.3	7.8
	bottom	-	-	-	7.6	8.3	7.8

Table 5 . Total estimated number and weight (g), with 80% confidence interval, of selected fishes and macroinvertebrates impinged at night on the traveling screens at the Oyster Creek Generating Station from 1 September 1978 through 31 March 1979.

SPECIES	ESTIMATED NUMBER	ESTIMATED WEIGHT
Anguilla rostrata	16,043 ± 18,146	110,476 ± 46,179
Alosa aestivalis	83,849 ± 28,060	333,413 ± 85,661
Alosa pseudoharengus	6,927 ± 2,292	94,218 ± 29,100
Brevoortia tyrannus	7,999 ± 4,805	704,455 ± 389,576
Anchoa mitchilli	3,532 ± 1,378	11,283 ± 4,429
Menidia menidia	135,625 ± 43,317	565,740 ± 174,154
Gasterosteus aculeatus	19,264 ± 5,053	49,046 ± 12,839
Syngnathus fuscus	16,009 ± 3,764	30,542 ± 7,227
Cynoscion regalis	599 ± 280	5,610 ± 3,222
Pseudopleuronectes americanus	128,883 ± 32,740	17,084,441 ± 6,643,368
Total of all Vertebrates	453,383 ± 93,426	19,440,716 ± 6,837,382
Polychaeta	11,317 ± 3,227	34,692 ± 12,631
Palaemonetes vulgaris	402,907 ± 98,979	182,139 ± 40,459
Crangon septemspinosa	3,302,364 ± 554,220	3,012,639 ± 535,223
Callinectes sapidus	45,937 ± 17,599	2,371,670 ± 978,178
Total of all Invertebrates	3,768,091 ± 598,267	5,700,710 ± 976,806
Grand Total of all Species[a]	4,221,475 ± 659,998	25,141,457 ± 6,904,987

[a]Grand total of all species does not equal the total of all vertebrates and invertebrates because each total was a separate estimate.

Table 6. Estimated number of fishes and macroinvertebrates[a] impinged by week on the traveling screens at the Oyster Creek Generating Station from 3 September 1978 through 31 March 1979.

	September			November	December					January	
	3-9	10-16	17-23	19-25	26-2	3-9	10-16	17-23	24-30	31-6	7-13
Vertebrates											
Anguilla rostrata	29	4	-	-	24	8	18	49	44	62	17
Alosa aestivalis	33	45	14	-	14	123	12254	7482	4648	44720	6904
Alosa pseudoharengus	11	4	-	-	-	4	35	11	744	464	119
Alosa sapidissima	-	-	-	-	-	-	6	29	166	410	35
Brevoortia tyrannus	21	19	-	-	14	135	3195	3096	376	147	4
Anchoa mitchilli	213	901	-	-	107	23	1667	135	214	30	18
Opsanus tau	146	113	7	21	7	94	25	67	67	21	10
Merluccius bilinearis	-	-	-	-	-	-	91	-	149	56	11
Urophycis chuss	-	-	-	-	-	-	14	54	170	38	12
Cyprinodon variegatus	-	-	-	-	14	4	28	599	450	204	247
Fundulus heteroclitus	-	-	-	-	68	49	11	77	77	18	15
Menidia menidia	-	14	-	-	773	1364	52311	21895	8741	12463	3139
Apeltes quadracus	-	-	-	-	7	138	193	817	1277	797	189
Gasterosteus aculeatus	-	-	-	-	-	4	24	17	17	8	30
Syngnathus fuscus	4	167	-	2275	3429	2396	2171	1766	1252	1564	134
Cynoscion regalis	187	202	-	-	-	9	97	-	-	-	-
Tautoga onitis	-	-	-	-	175	119	940	740	400	338	150
Ammodytes sp.	-	-	-	-	-	-	5	21	11	17	25
Gobiosoma bosci	-	-	-	-	38	711	4886	1697	816	69	104
Myoxocephalus aenaeus	-	-	-	-	-	7	11	47	61	198	52
Etropus microstomus	-	-	-	-	891	211	1209	166	64	65	39
Scophthalmus aquosus	-	-	-	-	28	7	44	44	11	71	8
Pseudopleuronectes americanus	-	-	-	-	72	115	2861	22713	8814	24594	3201
Total of all Vertebrate Species	721	1817	35	2394	6116	5681	82433	61686	29008	86513	14551
Invertebrates											
Class Polychaeta	-	-	-	-	35	359	308	880	614	339	873
Palaemonetes vulgaris	4	4	-	7	794	3132	15911	19265	38306	50516	13723
Crangon septemspinosa	4	-	-	21	85972	92094	326578	491373	552112	338985	136330
Cancer irroratus	-	-	-	-	9	170	280	68	21	24	42
Ovalipes ocellatus	109	146	21	1470	166	1758	267	7	-	-	-
Callinectes sapidus	12581	16562	1008	42	7	284	11	-	42	27	-
Total of all Invertebrate Species	12814	16869	1036	1540	86990	97854	343374	511681	591119	389906	150975
Grand Totals of all Species	13535	18686	1071	3934	93106	103534	425807	573367	620126	476420	165527

Table 6. (cont.)

	January 14-20	21-27	February 28-3	4-10	11-17	18-24	March 25-3	4-10	11-17	18-24	25-31
Vertebrates											
Anguilla rostrata	30	-	28	15159	74	22	-	76	4	18	28
Alosa aestivalis	1012	2318	3825	476	33	28	97	243	1778	217	70
Alosa pseudoharengus	22	450	2353	138	4	7	57	272	1321	269	56
Alosa sapidissima	57	306	69	23	-	15	-	-	-	-	-
Brevoortia tyrannus	-	11	33	-	-	-	-	-	-	-	-
Anchoa mitchilli	18	-	-	-	-	-	-	-	-	-	-
Opsanus tau	48	51	21	56	47	28	-	4	-	7	4
Merluccius bilinearis	-	33	93	19	-	-	-	-	-	-	-
Urophycis chuss	-	17	15	-	-	-	-	5	-	-	-
Cyprinodon variegatus	27	139	163	14	-	-	34	83	55	14	4
Fundulus heteroclitus	33	21	49	73	4	21	12	615	327	304	105
Menidia menidia	1849	6056	10159	2779	112	334	1083	2059	5707	468	441
Apeltes quadracus	286	511	502	1965	241	44	93	602	518	338	35
Gasterosteus aculeatus	28	1973	4605	411	17	51	1864	2962	4172	591	203
Syngnathus fuscus	170	193	101	106	-	15	7	21	252	1002	1117
Tautoga onitis	446	173	110	264	34	-	22	4	104	32	14
Ammodytes sp.	34	131	45	31	58	21	-	7	12	11	39
Gobiosoma bosci	46	459	58	151	41	7	-	4	-	-	-
Myoxocephalus aenaeus	-	43	45	31	39	14	8	16	26	-	-
Scophthalmus aquosus	17	32	169	20	-	-	5	9	12	7	4
Pseudopleuronectes americanus	6649	16153	13202	7203	3321	419	1170	1162	10202	170	28
Total of all Vertebrate Species	10835	29193	35803	28992	4058	1049	4467	8187	24566	3493	2156
Invertebrates											
Class Polychaeta	204	3882	888	143	112	29	46	2158	741	364	14
Palaemonetes vulgaris	9844	20459	21910	18675	129453	6626	8313	12884	10067	7402	4340
Crangon septemspinosa	237619	104006	183009	171337	280203	33357	28947	15634	104293	60583	27563
Cancer irroratus	13	16	9	-	4	35	8	138	36	88	14
Ovalipes ocellatus	-	-	-	-	-	-	-	11	-	155	25
Callinectes sapidus	-	-	-	19	4	-	7	75	-	3428	224
Total of all Invertebrate Species	247690	128363	205816	190278	409821	40047	37324	30976	115228	72074	32200
Grand Totals of all Species	258525	157556	241619	219270	413880	41096	41792	39163	139794	75566	34356

a. Only fishes and invertebrates with more than 100 specimens impinged from 3 September 1978 through 31 March 1979 are reported here.

Table 7. Estimated weight (g) of fishes and macroinvertebrates[a] impinged by week on the traveling screens at the Oyster Creek Generating Station from 3 September 1978 through 31 March 1979.

	September			November	December					January	
	3-9	10-16	17-23	19-25	26-2	3-9	10-16	17-23	24-30	31-6	7-13
Vertebrates											
Anguilla rostrata	3018	938	-	-	2927	381	945	20012	5494	54063	4621
Alosa aestivalis	3462	4231	1442	-	112	326	35031	20819	24808	132951	20461
Alosa pseudoharengus	879	79	-	-	-	32	585	158	17082	8709	1207
Alosa sapidissima	-	-	-	-	-	-	84	497	1677	3989	217
Brevoortia tyrannus	2615	2831	-	-	1834	11045	315006	284317	23870	10528	13
Anchoa mitchilli	615	2617	-	-	322	57	6023	412	729	134	51
Opsanus tau	2493	5472	28	1505	14	398	780	501	660	62	21
Merluccius bilinearis	-	-	-	-	-	-	843	-	17517	12058	1208
Urophycis chuss	-	-	-	-	-	-	79	988	2464	828	150
Cyprinodon variegatus	-	-	-	-	14	4	45	1146	757	343	397
Fundulus heteroclitus	-	-	-	-	453	216	48	223	208	25	69
Menidia menidia	-	63	-	-	3421	4748	210063	84371	32017	53953	12715
Apeltes quadracus	-	-	-	-	7	145	168	838	1152	752	229
Gasterosteus aculeatus	-	-	-	-	-	4	32	23	27	8	47
Syngnathus fuscus	11	401	-	4543	6194	4700	4353	3022	1815	2093	174
Cynoscion regalis	571	2251	-	-	-	88	2344	-	-	-	-
Tautoga onitis	-	-	-	-	3966	2203	15982	25651	15420	2974	2178
Ammodytes sp.	-	-	-	-	-	-	98	389	16	94	71
Gobiosoma bosci	-	-	-	-	19	366	5079	1681	789	85	90
Myoxocephalus aenaeus	-	-	-	-	-	77	148	1808	913	2867	1094
Etropus microstomus	-	-	-	-	8371	1523	8790	892	456	171	147
Scophthalmus aquosus	-	-	-	-	4466	291	8402	8584	33	4282	613
Pseudopleuronectes americanus	-	-	-	-	1054	11603	163012	1622103	648256	6157765	193185
Total of all Vertebrate Species	16217	28962	1603	6643	39097	40388	791677	2081446	807182	6454554	241362
Invertebrates											
Class Polychaeta	-	-	-	-	49	548	566	1814	967	834	2504
Palaemonetes vulgaris	4	4	-	7	470	1826	10750	10552	16414	19791	6085
Crangon septemspinosa	4	-	-	21	137948	95296	354920	524833	463734	294721	123492
Cancer irroratus	-	-	-	-	979	12625	14521	3280	784	1717	2578
Ovalipes ocellatus	132	229	21	7399	1661	7339	1507	29	-	-	-
Callinectes sapidus	819455	830969	42364	140	7	2359	466	-	185	27	-
Total of all Invertebrate Species	824242	833185	42455	7567	141233	121002	382938	541645	482204	317216	134758
Grand Totals of all Species	840459	862147	44058	14210	180330	161390	1174614	2623091	1289386	6771770	376120

Table 7. (cont.)

	January 14-20	21-27	February 28-3	4-10	11-17	18-24	March 25-3	4-10	11-17	18-24	25-31
Vertebrates											
Anguilla rostrata	2708	-	5661	4784	28	22	-	22	333	1850	1071
Alosa aestivalis	2671	9343	23536	1166	626	84	282	2479	37694	5226	1449
Alosa pseudoharengus	145	3427	29836	947	21	35	346	1863	21510	5091	998
Alosa sapidissima	461	2183	543	307	-	92	-	-	-	-	-
Brevoortia tyrannus	-	140	1000	-	-	-	-	-	-	-	-
Anchoa mitchilli	14	-	-	-	-	-	-	-	-	-	-
Opsanus tau	1848	351	41	103	130	308	-	578	-	14	175
Merluccius bilinearis	-	5061	12969	3114	-	-	-	-	-	-	-
Urophycis chuss	-	275	167	-	-	-	-	202	-	-	-
Cyprinodon variegatus	668	218	204	14	-	-	55	115	97	21	11
Fundulus heteroclitus	74	165	42	154	4	175	74	2129	1536	1112	763
Menidia menidia	6193	24412	50260	9979	349	1294	5373	11191	31267	2622	2562
Apeltes quadracus	1050	595	559	1540	290	67	115	631	565	414	32
Gasterosteus aculeatus	56	4946	11276	902	45	139	4987	8118	10730	1570	560
Syngnathus fuscus	300	329	156	179	-	22	18	70	491	2479	2807
Tautoga onitis	69372	5355	1473	5329	421	-	322	40	7778	244	91
Ammodytes sp.	75	188	244	78	222	63	-	18	24	42	273
Gobiosoma bosci	33	537	67	167	45	7	-	7	-	-	-
Myoxocephalus aenaeus	-	517	524	115	242	238	97	266	848	-	-
Scophthalmus aquosus	174	1426	5316	40	-	-	1428	18	1848	1876	1012
Pseudopleuronectes americanus	1296298	2782394	2206549	993489	77477	43177	114163	151648	345815	18392	2979
Total of all Vertebrate Species	1400981	2846200	2358228	1024404	81212	45888	127299	180947	463417	42675	14837
Invertebrates											
Class Polychaeta	304	16338	2874	262	256	71	124	7699	2070	1098	46
Palaemonetes vulgaris	5379	10333	11347	8330	48924	2490	4070	6049	4337	2993	2002
Crangon septemspinosa	197436	83099	140451	138906	218191	30043	26712	12557	95493	47175	27010
Cancer irroratus	740	1236	668	-	200	3094	666	10936	3050	8105	1075
Ovalipes ocellatus	-	-	-	-	-	-	-	50	-	745	56
Callinectes sapidus	-	-	-	193	4	-	7	514	-	4700	4029
Total of all Invertebrate Species	203937	111007	155341	148980	268083	35698	31653	38617	106592	65118	34325
Grand Totals of all Species	1604918	2957207	2513569	1173384	349294	81587	158952	219564	570009	107793	49161

a. Only fishes and invertebrates with more than 100 specimens impinged from 3 September 1978 through 31 March 1979 are reported here.

Table 8. Actual and estimated number and weight (g) of fishes and macroinvertebrates impinged on the traveling screens at the Oyster Creek Generating Station from 3 September 1978 through 31 March 1979.

Species	Actual		Estimated	
	Number	Weight	Number	Weight
Vertebrates				
Dasyatis sayi	3	1312	10	4590
Anguilla rostrata	4478	30686	15695	108877
Conger oceanicus	68	2138	293	9415
Alosa aestivalis	24659	93537	86333	328198
Alosa pseudoharengus	1810	26552	6338	92949
Alosa sapidissima	317	2858	1117	10051
Brevoortia tyrannus	2013	186366	7051	653198
Clupea harengus	4	744	13	2603
Anchoa mitchilli	936	3089	3328	10974
Esox niger	1	167	4	585
Synodus foetens	1	12	7	84
Notemigonus crysoleucas	6	33	20	114
Opsanus tau	232	4158	842	15480
Merluccius bilinearis	129	15077	453	52770
Urophycis chuss	93	1472	326	5153
Urophycis regius	6	55	20	191
Rissola marginata	5	184	32	1166
Strongylura marina	4	38	14	133
Cyprinodon variegatus	592	1172	2078	4109
Fundulus sp.	1	1	4	4
Fundulus diaphanus	6	14	20	50
Fundulus heteroclitus	523	2044	1877	7468
Fundulus majalis	26	256	89	895
Lucania parva	2	2	6	6
Menidia sp.	4	4	14	14
Menidia beryllina	13	20	45	70
Menidia menidia	37484	155570	131747	546853
Apeltes quadracus	2437	2604	8554	9149
Gasterosteus aculeatus	4843	12400	16976	43470
Hippocampus erectus	66	90	236	342
Syngnathus fuscus	4366	8222	18141	34156
Morone americana	60	12739	210	44587
Centropristis striata	21	2740	90	9711
Acantharcus pomotis	1	94	4	329
Lepomis gibbosus	11	58	37	202
Pomatomus saltatrix	10	212	40	750
Caranx hippos	30	35	103	122
Selene vomer	6	39	21	137
Bairdiella chrysura	13	30	52	128
Cynoscion regalis	142	1501	496	5253
Leiostomus xanthurus	3	85	11	299
Micropogon undulatus	48	71	171	252
Pogonias cromis	1	8	4	26
Tautoga onitis	1137	44804	4067	158799
Tautogolabrus adspersus	64	274	229	985
Mugil curema	7	72	25	251
Astroscopus guttatus	2	74	7	259
Chasmodes bosquianus	49	301	176	1082

Table 8. (cont.)

Species	Actual		Estimated	
	Number	Weight	Number	Weight
Hypsoblennius hentzi	30	268	115	1043
Ammodytes sp.	130	532	467	1894
Gobiosoma sp.	22	13	154	91
Gobiosoma bosci	2590	2560	9087	8971
Peprilus triacanthus	26	835	90	2922
Prionotus carolinus	2	2	8	8
Prionotus evolans	74	1162	343	4537
Myoxocephalus aenaeus	169	2753	598	9756
Myoxocephalus octodecemspinosus	16	311	55	1088
Etropus microstomus	629	4619	2646	20351
Paralichthys dentatus	1	3	4	9
Scophthalmus aquosus	135	10736	486	39807
Pseudopleuronectes americanus	34801	4802069	122050	16829356
Trinectes maculatus	29	720	100	2522
Sphoeroides maculatus	34	1184	119	4145
Fish fragments	-	667	-	2349
Rana pipiens	1	12	9	92
Total Vertebrates	125416	5442458	443755	19095218
Invertebrates				
Aequorea spp	13	350	44	1227
Class Bivalvia	2	2	6	6
Mytilus edulis	25	25	87	87
Class Polychaeta	3416	10962	11987	38426
Limulus polyphemus	1	924	4	3234
Penaeus aztecus	55	668	197	2373
Palaemonetes vulgaris	110835	48764	391635	172158
Crangon septemspinosa	917241	836582	3270020	3012042
Pagurus sp	1	2	4	7
Libinia dubia	1	2	4	7
Cancer irroratus	272	18348	974	66253
Carcinus maenas	3	18	9	62
Ovalipes ocellatus	945	4179	4136	19168
Portunus gibbesi	2	4	7	14
Callinectes sapidus	9655	481189	34323	1705418
Callinectes similis	9	41	32	142
Panopeus herbstii	1	10	4	35
Neopanope sayi	1	3	4	11
Phylum Echinodermata	2	82	7	287
Class Holothuroidea	60	801	210	2802
Asterias forbesi	35	420	122	1469
Invertebrate fragments	-	267	-	950
Phylum Nemertea	37	316	132	1149
Procambarus acutus	8	133	28	466
Total Invertebrates	1042619	1404091	3713973	5027794
Grand Totals	1168036	6846548	4157728	24123012

Table 5. Number per collection by temperature of selected fishes and macroinvertebrates impinged on the traveling screens at the Oyster Creek Generating Station from 3 September 1978 through 31 March 1979.

		FREQ	Alosa aestivalis	Alosa pseudoharengus	Brevoortia tyrannus	Anchoa mitchilli	Menidia menidia	Gasterosteus aculeatus	Syngnathus fuscus	Cynoscion regalis
T	25	1	1			4				4
E	24	3	2		1	8				5
M	23	7	1			7				3
P	22	5	1			4				2
E	21	3				1				1
R	20	0								
A	19	1	2		1	27			20	15
T	18	4	1		1	27	1		3	5
U	17	0								
R	16	0								
E	15	0								
	14	0								
	13	0								
	12	2	5	1			3	9	40	
	11	1	1	2			10	7	46	
	10	14	1	1			5	3	44	
	9	11	1				7	2	16	
	8	10	6	4	3		49	39	56	
	7	9	25	5	3	9	98	37	13	1
	6	12	22	5	4	6	90	17	39	1
	5	4	113	2	32	20	558	2	64	1
	4	26	132	7	23	5	345	30	8	
	3	24	44	5	8	3	132	23	7	
	2	25	93	5	1		77	7	9	
	1	24	73	3			33	6	4	
	0	20	45	3			26	5	1	
	-1	21	8	1			22	1	2	
	-2	1	5	1			2			
		228	580	45	77	121	1457	187	370	37

Table 9. (cont.)

		FREQ	Leiostomus xanthurus	Prionotus evolans	Paralichthys dentatus	Pseudopleuronec americanus	Sphoeroides maculatus	Palaemonetes vulgaris	Crangon septemspinosa	Callinectes sapidus
T	25	1					2	1	1	338
E	24	3					2			290
M	23	7		1			1			418
P	22	5								160
E	21	3					1			151
R	20	0								
A	19	1		6			4			719
T	18	4		1			1			215
U	17	0								
R	16	0								
E	15	0								
	14	0								
	13	0								
	12	2				2		498	1110	217
	11	1				4		306	792	129
	10	14						87	555	32
	9	11				1		20	494	3
	8	10		1		16		229	1944	7
	7	9				17		208	1752	2
	6	12		1		21		87	2183	
	5	4		1		51		477	4902	1
	4	26				126		285	3342	
	3	24				173		189	2404	
	2	25				89		293	3119	
	1	24				42		323	3261	
	0	20				52		874	2304	
	-1	21				41		151	1637	
	-2	1				23		42	308	
		228	0	10	0	658	11	4071	30109	2683

Table 10. Estimated number of fish and macroinvertebrates impinged on the traveling screens per week, per hour of darkness, and per 10 million liters of circulating water flow at the Oyster Creek Generating Station from 3 September 1978 through 31 March 1979.

Date		Estimated Number Impinged	Total Weekly Hours of Darkness	% Darkness	Number Impinged Per Hour of Darkness	Total Circulating Water Flow Liters x 10^7 (24 hours)	Liters x 10^7 (night)	Number Impinged Per Liters x 10^7
September	3-9	13,535	78.2	47	173	1,757	826	16
	10-16	18,686	80.4	48	232	1,620	778	24
	17-23	1,071	82.5	49	13	441	216	5
November	19-25	3,934	99.8	59	39	423	250	16
	26-2 Dec.	93,106	101.1	60	921	754	452	206
December	3-9	103,534	101.9	61	1,016	1,183	722	143
	10-16	425,807	102.5	61	4,154	1,695	1,034	412
	17-23	573,367	102.7	61	5,583	1,572	959	598
	24-30	620,126	102.5	61	6,050	1,757	1,072	578
	31-6 Jan.	476,420	102.1	61	4,666	1,757	1,072	444
January	7-13	165,527	101.3	60	1,634	1,757	1,054	157
	14-20	258,525	100.1	60	2,583	1,355	813	318
	21-27	157,556	98.7	59	1,596	1,757	1,037	152
	28-3 Feb.	241,619	96.9	58	2,493	1,757	1,019	237
February	4-10	219,270	95.2	57	2,303	1,676	955	230
	11-17	413,880	93.2	55	4,441	1,757	966	428
	18-24	41,096	91.3	54	450	1,757	949	43
	25-3 Mar.	41,792	89.0	53	470	1,757	931	45
March	4-10	39,163	86.7	52	452	1,757	914	43
	11-17	139,794	84.6	50	1,652	1,757	879	159
	18-24	75,566	82.2	49	919	1,757	861	88
	25-31	34,356	79.8	48	431	1,405	674	51
Total		4,157,728	2062.7			33,206		
Mean		188,988	93.3	56	2,026	1,509	838	200

Table 11. Total of live, dead, and damaged fishes and macroinvertebrates impinged on the traveling screens at the Oyster Creek Generating Station from 3 September 1978 through 31 March 1979

Species	Number	Live	Dead	Damaged	% Dead
Dasyatis sayi	1	-	-	1	0.0
Anguilla rostrata	3	2	-	1	0.0
Conger oceanicus	1	1	-	-	0.0
Alosa aestivalis	229	60	29	140	12.7
Alosa pseudoharengus	15	2	1	12	6.7
Alosa sapidissima	3	-	-	3	0.0
Brevoortia tyrannus	18	1	1	16	5.6
Anchoa mitchilli	37	5	17	15	45.9
Opsanus tau	8	6	-	2	0.0
Merluccius bilinearis	5	-	-	5	0.0
Urophycis chuss	1	1	-	-	0.0
Rissola marginata	1	1	-	-	0.0
Cyprinodon variegatus	8	4	-	4	0.0
Fundulus heteroclitus	2	2	-	-	0.0
Menidia menidia	384	231	50	103	13.0
Apeltes quadracus	22	15	1	6	4.5
Gasterosteus aculeatus	60	53	-	7	0.0
Hippocampus erectus	1	1	-	-	0.0
Syngnathus fuscus	256	235	4	17	1.6
Morone americana	3	-	-	3	0.0
Pomatomus saltatrix	1	-	-	1	0.0
Caranx hippos	2	2	-	-	0.0
Bairdiella chrysura	1	-	-	1	0.0
Cynoscion regalis	6	5	-	1	0.0
Tautoga onitis	31	31	-	-	0.0
Tautogolabrus adspersus	3	3	-	-	0.0
Gobiosoma bosci	10	-	10	-	100.0
Prionotus evolans	6	3	1	2	16.7
Myoxocephalus aenaeus	2	2	-	-	0.0
Etropus microstomus	16	11	-	5	0.0
Scophthalmus aquosus	5	1	-	4	0.0
Pseudopleuronectes americanus	615	360	5	250	0.8
Trinectes maculatus	2	2	-	-	0.0
Sphoeroides maculatus	4	4	-	-	0.0
Total Vertebrates	1762	1044	119	599	6.8
Class Polychaeta	49	19	6	24	12.2
Penaeus aztecus	3	2	1	-	33.3
Palaemonetes vulgaris	56	48	6	2	10.7
Crangon septemspinosa	1635	1262	220	153	13.5
Cancer irroratus	1	1	-	-	0.0
Ovalipes ocellatus	71	50	6	15	8.5
Callinectes sapidus	370	273	10	87	2.7
Callinectes similis	2	1	-	1	0.0
Neopanope sayi	1	1	-	-	0.0
Phylum Nemertea	2	-	-	2	0.0
Total Invertebrates	2190	1657	249	284	11.4
Grand Totals	3952	2701	368	883	9.3

Table 12. Total number of fishes and macroinvertebrates impinged on the Ristroph screen and taken in the live and debris troughs at the Oyster Creek Generating Station from 28 November 1978 through 9 January 1979.

	Specimens Collected	Live Trough No.	Live Trough %	Debris Trough No.	Debris Trough %
Anguilla rostrata	2	1	-	1	-
Conger oceanicus	2	2	-	0	-
Alosa aestivalis	20	4	-	16	-
Brevoortia tyrannus	11	2	-	9	-
Anchoa mitchilli	3	1	-	2	-
Opsanus tau	9	2	-	7	-
Merluccius bilinearis	1	0	-	1	-
Urophycis chuss	1	0	-	1	-
Cyprinodon variegatus	2	1	-	1	-
Menidia menidia	42	10	24	32	76
Apeltes quadracus	37	9	24	28	76
Syngnathus fuscus	49	14	29	35	71
Micropogon undulatus	1	0	-	1	-
Tautoga onitis	7	2	-	5	-
Hypsoblennius hentzi	3	0	-	3	-
Gobiosoma bosci	72	9	13	63	88
Myoxocephalus aenaeus	1	1	-	0	-
Etropus microstomus	3	0	-	3	-
Pseudopleuronectes americanus	155	20	13	135	87
Total Fishes	421	78	19	343	81
Urosalpinx cinereus	1	1	-	0	-
Class Polychaeta	41	6	15	35	85
Palaemonetes vulgaris	185	38	21	147	79
Crangon septemspinosa	3817	1208	32	2609	68
Cancer irroratus	3	2	-	1	-
Ovalipes ocellatus	9	3	-	6	-
Callinectes sapidus	2	0	-	2	-
Total Invertebrates	4058	1258	31	2800	69

Total sampling time was 560 mins (54 samples).

Table 13. Condition (live, damaged, dead) of fishes and macroinvertebrates impinged on the Ristroph screen at the Oyster Creek Generating Station from 28 November 1978 through 9 January 1979.

	Live Trough							Debris Trough							Both Troughs						
	Total	Live		Damaged		Dead		Total	Live		Damaged		Dead		Total	Live		Damaged		Dead	
	No.	No.	%	No.	%	No.	%	No.	No.	%	No.	%	No.	%	No.	No.	%	No.	%	No.	%
Anguilla rostrata	1	1	-	0	-	0	-	1	1	-	0	-	0	-	2	2	-	0	-	0	-
Conger oceanicus	2	2	-	0	-	0	-	-	-	-	-	-	-	-	2	2	-	0	-	0	-
Alosa aestivalis	4	2	-	2	-	0	-	15	6	-	8	-	1	-	19	8	-	10	-	1	-
Brevoortia tyrannus	2	0	-	2	-	0	-	9	0	-	9	-	0	-	11	0	-	11	-	0	-
Anchoa mitchilli	1	0	-	0	-	1	-	2	0	-	0	-	2	-	3	0	-	0	-	3	-
Opsanus tau	2	2	-	0	-	0	-	7	2	-	0	-	5	-	9	4	-	0	-	5	-
Merluccius bilinearis	-	-	-	-	-	-	-	1	0	-	1	-	0	-	1	0	-	1	-	0	-
Urophycis chuss	-	-	-	-	-	-	-	1	0	-	1	-	0	-	1	0	-	1	-	0	-
Cyprinodon variegatus	1	1	-	0	-	0	-	1	0	-	1	-	0	-	2	1	-	1	-	0	-
Menidia menidia	8	3	-	4	-	1	-	30	17	57	9	30	4	13	38	20	53	13	34	5	13
Apeltes quadracus	9	4	-	1	-	4	-	28	22	79	0	0	6	21	37	26	70	1	3	10	27
Syngnathus fuscus	13	11	-	2	-	0	-	35	30	86	3	9	2	6	48	41	85	5	10	2	4
Micropogon undulatus	-	-	-	-	-	-	-	1	0	-	0	-	1	-	1	0	-	0	-	1	-
Tautoga onitis	2	2	-	0	-	0	-	5	5	-	0	-	0	-	7	7	-	0	-	0	-
Hypsoblennius hentzi	-	-	-	-	-	-	-	2	1	-	1	-	0	-	2	1	-	1	-	0	-
Gobiosoma bosci	9	0	-	0	-	9	-	63	3	5	9	14	51	81	72	3	4	9	13	60	83
Myoxocephalus aenaeus	1	1	-	0	-	0	-	-	-	-	-	-	-	-	1	1	-	0	-	0	-
Etropus microstomus	-	-	-	-	-	-	-	3	2	-	1	-	0	-	3	2	-	1	-	0	-
Pseudopleuronectes americanus	20	18	-	2	-	0	-	135	116	86	19	14	0	0	155	134	86	21	14	0	0
Total Fishes	75	47	63	13	17	15	20	339	205	60	62	18	72	21	414	252	61	75	18	87	21
Urosalpinx cinereus	1	1	-	0	-	0	-	-	-	-	-	-	-	-	1	1	-	0	-	0	-
Class Polychaeta	6	1	-	4	-	1	-	35	16	46	13	37	6	17	41	17	41	17	41	7	17
Palaemonetes vulgaris	37	34	92	1	3	2	5	139	126	91	4	3	9	6	176	160	91	5	3	11	6
Crangon septemspinosa	1189	1107	93	24	2	58	5	2400	2252	94	60	3	88	4	3589	3359	94	84	2	146	4
Cancer irroratus	2	2	-	0	-	0	-	1	1	-	0	-	0	-	3	3	-	0	-	0	-
Ovalipes ocellatus	3	3	-	0	-	0	-	6	6	-	0	-	0	-	9	9	-	0	-	0	-
Callinectes sapidus	-	-	-	-	-	-	-	2	2	-	0	-	0	-	2	2	-	0	-	0	-
Total Invertebrates	1238	1148	93	29	2	61	5	2583	2403	93	77	3	103	4	3821	3551	93	106	3	164	4

Total sampling time was 530 mins (53 samples).

Table 14. Description of trawl and seine stations regularly sampled during Oyster Creek Generating Station Ecological Studies.

Station 1: Cedar Creek Mouth	
Trawl	
Area Sampled:	Navigation channel in mouth of Cedar Creek, west of Intracoastal Waterway can buoy C "63"; tow is made in mid-channel between flashing light FL "1" and the third black channel marker inside Cedar Creek.
Depth Sampled:	1.5 to 2.1 m.
Current:	Very slight, dependent on tide.
Claridty:	Clear to tannic brown.
Aquatic Vegetation:	Zostera marina attached and detrital, Agardhiella, and Ulva occasional to abundant.
Seine	
Area Sampled:	Off the easternmost peninsula of the north bank of Cedar Creek mouth, area sampled is approximately 100 m of a narrow (5 m) sandy beach on the south side of the peninsular tip.
Beach and Bottom Composition:	Hard-packed sand and gravel; slope very gentle.
Depth Sampled:	0 to 1 m; during extremely high tides entire beach is submerged to vegetation zone.
Current:	Slight, dependent on tide.
Clarity:	Normally clear, turbid with surf.
Aquatic Vegetation:	Scattered beds of Zostera marina; occasional Ulva and detritus.
Station 4: Forked River Mouth	
Trawl	
Area Sampled:	Mouth of Forked River, west of Intracoastal Waterway mid-channel marker BW N "D1"; tow is made in north approach channel between buoys 5 and 6 outside of mouth and buoys 9 and 10 inside of mouth.

Table 14. (cont.)

Depth Sampled:	1.5 to 2.1 m.
Current:	Slight to moderate, westerly due to influence of OCGS.
Clarity:	Clear to turbid.
Aquatic Vegetation:	Detritus (Zostera marina) none to abundant: Ulva and Codium none to occasional.

Seine

Area Sampled:	At the easternmost point of the south bank of Forked River mouth; area sampled is approximately 100 m of a narrow (5 m) sandy beach in the cove on the north side of the point.
Beach and Bottom Composition:	Soft sand throughout sampling area with frequent patches of mud; slope gentle.
Depth Sampled:	0 to 1.1 m.
Current:	Slight, westerly due to influence of OCGS.
Clarity:	Normally clear.
Aquatic Vegetation:	Occasional patches of Zostera marina; floating Zostera, Ulva and detritus, occasional to common.

Station 17: Oyster Creek Mouth

Trawl

Area Sampled:	Mouth of Oyster Creek, due west of Intracoastal Waterway mid-channel marker BW N "E1"; tow is made west to east beginning at second black channel stake located just west of bulkhead on north bank and ending in vicinity of first channel marker can and nun.
Depth Sampled:	1.8 to 3.7 m.
Current:	Slight to moderate, easterly due to influence OCGS.
Clarity:	Clear to turbid.
Aquatic Vegetation:	Detritus rare to common; Zostera and Codium fragile none to occasional; shellhash occasional.

Table 14. (cont.)

	Seine
Area Sampled:	North bank of Oyster Creek mouth. Area sampled in approximately 100 m of a narrow (5 m) sandy beach immediately east of the bulkhead at the mouth of Oyster Creek.
Beach and Bottom Composition:	Hard sand and coarse gravel from shore to a depth of about 0.6 m, becoming soft sand and mud to edge of sampling area; slope steep.
Depth Sampled:	0 to 1.2 m.
Current:	Slight to moderate, easterly due to influence of OCGS.
Clarity:	Normally clear, turbid with surf.
Aqatic Vegetation:	None attached in immediate sampling area; occasional floating Zostera marina, Ulva, Codium, and detritus.
	Station 23: Double Creek Mouth
	Trawl
Area Sampled:	Mouth of Double Creek, southwest of Intracoastal Waterway flashing light FL R "68"; tow is made in mid-channel between the fourth black channel stake inside Double Creek and the flashing light FL R "2".
Depth Sampled:	2.1 to 3.7 m.
Current:	Slight, dependent on tide.
Clarity:	Usually clear.
Aquatic Vegetation:	Zostera marina and detritus, occasional to abundant; Ulva and Codium fragile occasional to common.
	Seine
Area Sampled:	North bank of mouth of Double Creek, area sampled is approximately 100 m of a narrow (5 m) sandy beach, located between two groin bulkheads immediately northwest of Double Creek flashing light FL R "2".

Table 14. (cont.)

Beach and Bottom Composition:	Firm sand throughout with some gravel to edge of sampling area; slope gentle.
Depth Sampled:	0 to 0.8 m.
Current:	None to slight.
Clarity:	Clear to turbid.
Aquatic Vegetation:	Attached and floating Zostera marina occasional to abundant, Codium fragile and detritus occasional to common; beach often completely covered with a layer of dead Zostera up to 30 cm thick.

Table 15. Total number of specimens taken by trawl and seine from September 1978 through March 1979 at the mouth of Cedar Creek, Forked River, Oyster Creek, and Double Creek

Species	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Totals
Anguilla rostrata	10	12	1	-	2	-	6	31
Conger oceanicus	-	3	1	-	-	-	-	4
Alosa aestivalis	1	-	-	3	259	-	70	333
Alosa pseudoharengus	-	1	-	1	15	1	31	49
Alosa sapidissima	-	-	-	-	12	-	1	13
Brevoortia tyrannus	-	-	-	2	-	-	-	2
Anchoa hepsetus	1	-	-	-	-	-	-	1
Anchoa mitchilli	2025	1398	956	23	1	-	1	4404
Synodus foetens	1	-	-	-	-	-	-	1
Opsanus tau	53	19	9	-	2	-	-	83
Cyprinodon variegatus	-	2	1	1	-	-	10	14
Fundulus heteroclitus	16	11	19	43	19	30	49	187
Fundulus majalis	5	-	-	13	1	-	6	25
Lucania parva	3	-	-	-	-	-	-	3
Menidia beryllina	1	4	7	6	-	22	15	55
Menidia menidia	507	361	397	2800	77	42	491	4675
Apeltes quadracus	79	13	195	228	195	29	121	860
Gasterosteus aculeatus	-	-	-	-	-	-	9	9
Syngnathus fuscus	66	67	86	26	4	-	1	250
Morone americana	-	-	1	-	-	-	3	4
Costethus lineatus	1	-	-	-	-	-	-	1
Pomatomus saltatrix	3	5	-	-	-	-	-	8
Caranx hippos	9	2	-	-	-	-	-	11
Selene vomer	-	2	-	-	-	-	-	2
Trachinotus falcatus	48	5	1	-	-	-	-	54
Stenotomus chrysops	1	-	-	-	-	-	-	1
Bairdiella chrysura	5	7	-	-	-	-	-	12
Cynoscion regalis	41	48	1	-	-	-	-	90
Menticirrhus saxatilis	11	-	-	-	-	-	-	11
Chaetodon ocellatus	-	1	-	-	-	-	-	1
Tautoga onitis	6	16	57	13	8	1	2	103
Tautogolabrus adspersus	-	-	2	1	-	1	-	4
Mugil curema	4	3	-	-	-	-	-	7
Chasmodes bosquianus	1	3	3	-	-	-	-	7
Hypsoblennius hentzi	1	-	-	-	-	-	-	1
Ammodytes sp.	-	-	-	-	-	-	1	1
Gobiosoma bosci	8	33	4	12	1	-	1	59
Gobiosoma ginsburgi	-	-	1	-	-	-	-	1
Peprilus triacanthus	-	1	-	-	-	-	-	1
Prionotus evolans	11	3	-	-	-	-	-	14
Etropus microstomus	-	-	1	3	1	-	-	5
Paralichthys dentatus	1	1	-	-	-	-	-	2
Scophthalmus aquosus	-	-	1	1	-	-	-	2
Pseudopleuronectes americanus	2	3	19	97	38	1	153	313
Trinectes maculatus	2	14	5	1	-	-	2	24
Sphoeroides maculatus	17	-	-	-	-	-	-	17
Crangon septemspinosa	312	635	4699	20516	8926	23	2392	37503
Callinectes sapidus	159	123	66	88	1	-	37	474
Callinectes similis	-	-	-	2	-	-	-	2
Total Specimens	3411	2796	6533	23880	9562	150	3402	49734
Total Taxa	33	29	24	21	17	9	21	49
Total Collections	36	36	36	36	32	8	36	220

Table 16. Total number of specimens taken by 4.9-m trawl from September 1978 through March 1979 at the mouth of Cedar Creek, Forked River, Oyster Creek, and Double Creek

Species	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Totals
Anguilla rostrata	3	3	-	-	1	-	2	9
Conger oceanicus	-	3	-	-	-	-	-	3
Alosa aestivalis	-	-	-	-	66	-	5	71
Alosa pseudoharengus	-	-	-	1	14	-	6	21
Alosa sapidissima	-	-	-	-	12	-	-	12
Brevoortia tyrannus	-	-	-	2	-	-	-	2
Anchoa mitchilli	1810	1082	921	23	1	-	-	3837
Opsanus tau	20	3	2	-	2	-	-	27
Fundulus heteroclitus	-	-	-	-	-	-	2	2
Menidia beryllina	-	-	-	-	-	-	1	1
Menidia menidia	2	7	58	95	7	-	2	171
Apeltes quadracus	-	-	2	118	69	-	39	228
Gasterosteus aculeatus	-	-	-	-	-	-	1	1
Syngnathus fuscus	-	7	2	7	2	-	-	18
Morone americana	-	-	1	-	-	-	-	1
Caranx hippos	3	-	-	-	-	-	-	3
Selene vomer	-	1	-	-	-	-	-	1
Stenotomus chrysops	1	-	-	-	-	-	-	1
Cynoscion regalis	31	40	1	-	-	-	-	72
Menticirrhus saxatilis	1	-	-	-	-	-	-	1
Tautoga onitis	2	1	3	6	6	-	-	18
Tautogolabrus adspersus	-	-	-	1	-	-	-	1
Chasmodes bosquianus	-	-	1	-	-	-	-	1
Gobiosoma bosci	1	18	1	7	1	-	1	29
Prionotus evolans	8	1	-	-	-	-	-	9
Etropus microstomus	-	-	-	2	1	-	-	3
Paralichthys dentatus	-	1	-	-	-	-	-	1
Scophthalmus aquosus	-	-	1	1	-	-	-	2
Pseudopleuronectes americanus	-	1	13	90	22	-	93	219
Trinectes maculatus	-	12	5	1	-	-	2	20
Sphoeroides maculatus	3	-	-	-	-	-	-	3
Crangon septemspinosa	3	119	1315	9305	6353	-	912	18007
Callinectes sapidus	18	20	2	49	-	-	12	101
Total Specimens	1906	1319	2328	9708	6557	0	1078	22896
Total Taxa	14	16	15	15	14	0	13	33
Total Collections	12	12	12	12	12	0	12	72

Table 17. Total number of specimens taken by 45.7-m seine from September 1978 through March 1979 at the mouth of Cedar Creek, Forked River, Oyster Creek, and Double Creek

Species	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Totals
Anguilla rostrata	7	7	-	-	-	-	4	18
Conger oceanicus	-	-	1	-	-	-	-	1
Alosa aestivalis	1	-	-	2	193	-	65	261
Alosa pseudoharengus	-	1	-	-	1	1	25	28
Alosa sapidissima	-	-	-	-	-	-	1	1
Anchoa mitchilli	88	188	17	-	-	-	-	293
Opsanus tau	33	16	7	-	-	-	-	56
Cyprinodon variegatus	-	-	-	-	-	-	1	1
Fundulus heteroclitus	2	1	5	4	3	4	3	22
Fundulus majalis	-	-	-	9	1	-	2	12
Menidia beryllina	-	-	4	1	-	15	-	20
Menidia menidia	126	61	98	504	58	10	78	935
Apeltes quadracus	30	2	12	31	20	-	12	107
Gasterosteus aculeatus	-	-	-	-	-	-	5	5
Syngnathus fuscus	50	38	78	17	1	-	1	185
Morone americana	-	-	-	-	-	-	2	2
Oostethus lineatus	1	-	-	-	-	-	-	1
Pomatomus saltatrix	2	5	-	-	-	-	-	7
Caranx hippos	3	-	-	-	-	-	-	3
Trachinotus falcatus	14	4	-	-	-	-	-	18
Bairdiella chrysura	4	7	-	-	-	-	-	11
Cynoscion regalis	9	7	-	-	-	-	-	16
Menticirrhus saxatilis	10	-	-	-	-	-	-	10
Chaetodon ocellatus	-	1	-	-	-	-	-	1
Tautoga onitis	4	15	54	6	2	1	2	84
Tautogolabrus adspersus	-	-	2	-	-	-	-	2
Mugil curema	3	2	-	-	-	-	-	5
Chasmodes bosquianus	1	3	2	-	-	-	-	6
Hypsoblennius hentzi	1	-	-	-	-	-	-	1
Gobiosoma bosci	4	4	2	3	-	-	-	13
Gobiosoma ginsburgi	-	-	1	-	-	-	-	1
Peprilus triacanthus	-	1	-	-	-	-	-	1
Prionotus evolans	3	2	-	-	-	-	-	5
Etropus microstomus	-	-	1	1	-	-	-	2
Paralichthys dentatus	1	-	-	-	-	-	-	1
Pseudopleuronectes americanus	1	2	6	7	15	-	52	83
Trinectes maculatus	1	1	-	-	-	-	-	2
Sphoeroides maculatus	12	-	-	-	-	-	-	12
Crangon septemspinosa	20	50	1377	7536	934	3	227	10147
Callinectes sapidus	109	78	48	34	1	-	21	291
Callinectes similis	-	-	-	2	-	-	-	2
Total Specimens	540	496	1715	8157	1229	34	501	12672
Total Taxa	27	23	17	14	11	6	16	41
Total Collections	12	12	12	12	10	4	12	74

Table 18. Total number of specimens taken by 12.2-m seine from September 1978 through March 1979 at the mouth of Cedar Creek, Forked River, Oyster Creek, and Double Creek

Species	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Totals
Anguilla rostrata	-	2	1	-	1	-	-	4
Alosa aestivalis	-	-	-	1	-	-	-	1
Anchoa hepsetus	1	-	-	-	-	-	-	1
Anchoa mitchilli	127	128	18	-	-	-	1	274
Synodus foetens	1	-	-	-	-	-	-	1
Cyprinodon variegatus	-	2	1	1	-	-	9	13
Fundulus heteroclitus	14	10	14	39	16	26	44	163
Fundulus majalis	5	-	-	4	-	-	4	13
Lucania parva	3	-	-	-	-	-	-	3
Menidia beryllina	1	4	3	5	-	7	14	34
Menidia menidia	379	293	241	2201	12	32	411	3569
Apeltes quadracus	49	11	181	79	106	29	70	525
Gasterosteus aculeatus	-	-	-	-	-	-	3	3
Syngnathus fuscus	16	22	6	2	1	-	-	47
Morone americana	-	-	-	-	-	-	1	1
Pomatomus saltatrix	1	-	-	-	-	-	-	1
Caranx hippos	3	2	-	-	-	-	-	5
Selene vomer	-	1	-	-	-	-	-	1
Trachinotus falcatus	34	1	1	-	-	-	-	36
Bairdiella chrysura	1	-	-	-	-	-	-	1
Cynoscion regalis	1	1	-	-	-	-	-	2
Tautoga onitis	-	-	-	1	-	-	-	1
Tautogolabrus adspersus	-	-	-	-	-	1	-	1
Mugil curema	1	1	-	-	-	-	-	2
Ammodytes sp.	-	-	-	-	-	-	1	1
Gobiosoma bosci	3	11	1	2	-	-	-	17
Pseudopleuronectes americanus	1	-	-	-	1	1	8	11
Trinectes maculatus	1	1	-	-	-	-	-	2
Sphoeroides maculatus	2	-	-	-	-	-	-	2
Crangon septemspinosa	289	466	2007	3675	1639	20	1253	9349
Callinectes sapidus	32	25	16	5	-	-	4	82
Total Specimens	965	981	2490	6015	1776	116	1823	14166
Total Taxa	22	17	12	12	7	7	13	31
Total Collections	12	12	12	12	10	4	12	74

Table 19. Total number of specimens taken in collections during day and night at the mouth of Oyster Creek and Forked River from September 1978 through March 1979.

Species	September		October		November		December		January		February		March	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Anguilla rostrata	2	7	2	7	-	-	-	-	1	1	-	-	-	6
Conger oceanicus	-	-	-	3	-	1	-	-	-	-	-	-	-	-
Alosa aestivalis	-	1	-	-	-	-	-	1	51	208	-	-	2	68
Alosa pseudoharengus	-	-	-	1	-	-	1	-	13	2	-	1	4	27
Alosa sapidissima	-	-	-	-	-	-	-	-	11	1	-	-	-	1
Brevoortia tyrannus	-	-	-	-	-	-	2	-	-	-	-	-	-	-
Anchoa hepsetus	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Anchoa mitchilli	84	54	359	242	48	624	21	-	-	-	-	-	-	1
Synodus foetens	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Opsanus tau	4	35	3	11	-	6	-	-	2	-	-	-	-	-
Cyprinodon variegatus	-	-	1	1	-	1	-	1	-	-	-	-	6	3
Fundulus heteroclitus	1	2	6	5	7	5	12	16	5	14	2	28	19	25
Fundulus majalis	-	-	-	-	-	-	2	10	-	-	-	-	1	5
Menidia beryllina	-	-	-	2	-	1	4	2	-	-	21	1	2	1
Menidia menidia	86	47	174	24	80	256	99	150	19	47	22	20	19	453
Apeltes quadracus	2	-	4	6	-	3	31	78	19	125	6	23	25	76
Gasterosteus aculeatus	-	-	-	-	-	-	-	-	-	-	-	-	1	6
Syngnathus fuscus	8	14	15	23	15	40	8	7	2	-	-	-	-	-
Morone americana	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Pomatomus saltatrix	-	1	-	3	-	-	-	-	-	-	-	-	-	-
Caranx hippos	5	4	2	-	-	-	-	-	-	-	-	-	-	-
Selene vomer	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Trachinotus falcatus	38	10	-	4	1	-	-	-	-	-	-	-	-	-
Stenotomus chrysops	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Bairdiella chrysura	4	1	2	4	-	-	-	-	-	-	-	-	-	-
Cynoscion regalis	5	34	3	42	-	1	-	-	-	-	-	-	-	-
Menticirrhus saxatilis	3	8	-	-	-	-	-	-	-	-	-	-	-	-
Chaetodon ocellatus	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Tautoga onitis	5	1	8	7	22	28	5	8	1	7	-	1	-	2
Tautogolabrus adspersus	-	-	-	-	-	-	-	1	-	-	1	-	-	-
Mugil curema	4	-	-	3	-	-	-	-	-	-	-	-	-	-
Chasmodes bosquianus	-	1	3	-	1	-	-	-	-	-	-	-	-	-
Hypsoblennius hentzi	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Ammodytes sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Gobiosoma bosci	-	4	2	31	1	3	5	6	1	-	-	-	-	1
Peprilus triacanthus	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Prionotus evolans	3	8	-	3	-	-	-	-	-	-	-	-	-	-
Etropus microstomus	-	-	-	-	-	1	1	2	-	1	-	-	-	-
Scophthalmus aquosus	-	-	-	-	-	1	-	1	-	-	-	-	-	-
Pseudopleuronectes americanus	-	-	1	2	2	9	8	83	8	29	1	-	40	93
Trinectes maculatus	-	1	-	14	-	5	-	1	-	-	-	-	-	2
Sphoeroides maculatus	6	10	-	-	-	-	-	-	-	-	-	-	-	-
Crangon septemspinosa	5	15	62	518	174	2779	1939	14736	1102	7676	18	5	947	1022
Callinectes sapidus	46	51	38	49	21	35	11	75	1	-	-	-	2	35
Total Specimens	313	311	686	1007	372	3799	2149	15178	1236	8111	71	79	1068	1831
Total Taxa	20	23	18	25	11	18	15	17	14	11	7	7	12	20
Total Collections	12	12	12	12	12	12	12	12	12	12	4	4	12	12

Table 20. A comparison of the total number of specimens taken by month at the mouth of Cedar Creek, Forked River, Oyster Creek, and Double Creek from September 1978 through March 1979.

	SEPTEMBER 1978			
Location	Cedar Creek	Forked River	Oyster Creek	Double Creek
Temperature: air	15.5 - 25.0	15.0 - 27.0	17.5 - 27.0	25.0 - 27.5
Surface	18.5 - 21.5	18.8 - 24.4	18.4 - 27.0	20.7 - 23.3
Bottom	22.7 - 22.7	22.8 - 24.0	25.9 - 27.0	23.6 - 23.6
Salinity: Surface	7.5 - 13.0	15.0 - 18.0	15.0 - 21.0	19.0 - 20.0
Bottom	12.5 - 13.0	15.0 - 17.0	17.0 - 17.0	20.0 - 20.0
Oxygen: Surface	7.8 - 8.1	7.1 - 9.0	7.7 - 8.4	8.0 - 8.3
Bottom	7.8 - 7.8	8.6 - 8.8	7.6 - 7.8	8.0 - 8.1
pH: Surface	7.2 - 7.6	7.5 - 7.8	7.4 - 7.8	7.4 - 8.0
Bottom	7.4 - 7.4	7.5 - 7.5	7.5 - 7.6	7.4 - 7.4
Secchi (cm.)	85.0 - 85.0	120.0 - 120.0	140.0 - 140.0	100.0 - 100.0
Species	No.	No.	No.	No.
Anguilla rostrata	1	8	1	-
Alosa aestivalis	-	1	-	-
Anchoa hepsetus	-	-	1	-
Anchoa mitchilli	1224	118	20	663
Synodus foetens	-	-	1	-
Opsanus tau	9	26	13	5
Fundulus heteroclitus	-	2	1	13
Fundulus majalis	-	-	-	5
Lucania parva	-	-	-	3
Menidia beryllina	-	-	-	1
Menidia menidia	171	46	87	203
Apeltes quadracus	2	2	-	75
Syngnathus fuscus	6	19	3	38
Oostethus lineatus	-	-	-	1
Pomatomus saltatrix	2	1	-	-
Caranx hippos	-	1	8	-
Trachinotus falcatus	-	2	46	-
Stenotomus chrysops	-	-	1	-
Bairdiella chrysura	-	5	-	-
Cynoscion regalis	1	33	6	1
Menticirrhus saxatilis	-	8	3	-
Tautoga onitis	-	4	2	-
Mugil curema	-	3	1	-
Chasmodes bosquianus	-	1	-	-
Hypsoblennius hentzi	-	-	1	-
Gobiosoma bosci	-	2	2	4
Prionotus evolans	-	8	3	-
Paralichthys dentatus	1	-	-	-
Pseudopleuronectes americanus	1	-	-	1
Trinectes maculatus	-	1	-	1
Sphoeroides maculatus	-	15	1	1
Crangon septemspinosa	172	20	-	120
Callinectes sapidus	20	39	58	42
Total Specimens	1610	365	259	1177
Total Collections	6	12	12	6

Table 20. (cont.)

		OCTOBER 1978			
Location		Cedar Creek	Forked River	Oyster Creek	Double Creek
Temperature:	air	18.0 - 20.5	16.0 - 21.0	18.0 - 22.0	21.4 - 21.5
	Surface	16.4 - 17.2	17.2 - 18.0	16.6 - 18.8	17.8 - 19.0
	Bottom	16.8 - 16.8	17.0 - 18.0	17.4 - 18.0	17.8 - 17.8
Salinity:	Surface	11.5 - 17.5	17.5 - 20.0	15.5 - 17.5	21.0 - 21.5
	Bottom	11.5 - 12.0	20.0 - 20.5	17.0 - 18.0	20.5 - 21.0
Oxygen:	Surface	8.1 - 8.6	8.5 - 9.6	8.2 - 9.0	8.5 - 9.1
	Bottom	8.7 - 8.7	8.7 - 8.9	8.1 - 8.3	8.6 - 8.6
pH:	Surface	7.7 - 8.2	7.9 - 8.3	7.8 - 8.2	8.0 - 8.2
	Bottom	7.8 - 7.8	8.1 - 8.3	8.1 - 8.2	8.2 - 8.3
Secchi (cm.)		130.0 - 130.0	135.0 - 135.0	140.0 - 140.0	130.0 - 130.0
Species		No.	No.	No.	No.
Anguilla rostrata		-	5	4	3
Conger oceanicus		-	3	-	-
Alosa pseudoharengus		-	-	1	-
Anchoa mitchilli		450	394	207	347
Opsanus tau		-	4	10	5
Cyprinodon variegatus		-	1	1	-
Fundulus heteroclitus		-	2	9	-
Menidia beryllina		-	2	-	2
Menidia menidia		114	105	93	49
Apeltes quadracus		2	10	-	1
Syngnathus fuscus		1	31	7	28
Pomatomus saltatrix		1	1	2	1
Caranx hippos		-	2	-	-
Selene vomer		-	-	1	1
Trachinotus falcatus		-	-	4	1
Bairdiella chrysura		-	6	-	1
Cynoscion regalis		-	34	11	3
Chaetodon ocellatus		-	1	-	-
Tautoga onitis		-	15	-	1
Mugil curema		-	3	-	-
Chasmodes bosquianus		-	1	2	-
Gobiosoma bosci		-	25	8	-
Peprilus triacanthus		-	-	1	-
Prionotus evolans		-	1	2	-
Paralichthys dentatus		1	-	-	-
Pseudopleuronectes americanus		-	2	1	-
Trinectes maculatus		-	1	13	-
Crangon septemspinosa		21	194	386	34
Callinectes sapidus		11	35	52	25
Total Specimens		601	878	815	502
Total Collections		6	12	12	6

Table 20. (cont.)

		NOVEMBER 1978			
Location		Cedar Creek	Forked River	Oyster Creek	Double Creek
Temperature:	air	10.2 - 13.0	10.5 - 15.0	11.0 - 16.0	10.2 - 15.0
	Surface	11.7 - 13.1	10.9 - 13.4	11.8 - 13.1	11.6 - 13.1
	Bottom	12.6 - 12.6	11.6 - 13.3	12.6 - 13.1	13.1 - 13.1
Salinity:	Surface	18.0 - 18.5	20.0 - 21.0	19.0 - 20.0	21.0 - 23.0
	Bottom	19.5 - 19.5	21.0 - 21.0	19.0 - 20.0	23.0 - 24.0
Oxygen:	Surface	9.2 - 9.6	8.8 - 12.0	9.3 - 12.5	9.7 - 9.8
	Bottom	9.7 - 9.7	8.7 - 9.8	9.5 - 9.6	9.6 - 9.7
pH:	Surface	7.6 - 8.2	7.5 - 8.3	7.5 - 8.2	7.6 - 8.1
	Bottom	8.1 - 8.5	7.5 - 8.2	7.5 - 8.1	7.9 - 8.1
Secchi (cm.)		150.0 - 150.0	140.0 - 140.0	130.0 - 130.0	170.0 - 170.0
Species		No.	No.	No.	No.
Anguilla rostrata		-	-	-	1
Conger oceanicus		-	-	1	-
Anchoa mitchilli		72	652	20	212
Opsanus tau		2	-	6	1
Cyprinodon variegatus		-	1	-	-
Fundulus heteroclitus		-	5	7	7
Menidia beryllina		4	1	-	2
Menidia menidia		19	163	173	42
Apeltes quadracus		1	2	1	191
Syngnathus fuscus		14	44	11	17
Morone americana		-	-	-	1
Trachinotus falcatus		-	-	1	-
Cynoscion regalis		-	1	-	-
Tautoga onitis		-	47	3	7
Tautogolabrus adspersus		-	-	-	2
Chasmodes bosquianus		-	-	1	2
Gobiosoma bosci		-	-	4	-
Gobiosoma ginsburgi		-	-	-	1
Etropus microstomus		-	-	1	-
Scophthalmus aquosus		-	-	1	-
Pseudopleuronectes americanus		1	6	5	7
Trinectes maculatus		-	-	5	-
Crangon septemspinosa		312	1566	1387	1434
Callinectes sapidus		3	17	39	7
Total Specimens		428	2505	1666	1934
Total Collections		6	12	12	6

Table 20. (cont.)

Location		DECEMBER 1978 Cedar Creek	Forked River	Oyster Creek	Double Creek
Temperature:	air	8.0 - 8.0	4.0 - 15.0	3.5 - 12.0	8.5 - 13.0
	Surface	6.5 - 6.7	6.0 - 8.9	6.4 - 9.2	7.4 - 9.5
	Bottom	6.8 - 7.0	7.4 - 8.0	6.6 - 7.6	7.4 - 7.5
Salinity:	Surface	13.0 - 20.0	20.0 - 23.0	18.0 - 20.0	24.0 - 25.0
	Bottom	20.0 - 22.0	24.0 - 24.0	19.0 - 24.0	24.0 - 25.0
Oxygen:	Surface	9.8 - 10.8	10.8 - 12.4	10.1 - 11.5	11.0 - 11.3
	Bottom	10.5 - 10.5	10.5 - 12.0	10.3 - 12.1	11.1 - 11.1
pH:	Surface	8.1 - 8.1	8.0 - 8.2	8.0 - 8.2	8.2 - 8.2
	Bottom	7.9 - 8.2	8.1 - 8.2	8.0 - 8.1	8.1 - 8.2
Secchi (cm)		120.0 - 120.0	120.0 - 120.0	110.0 - 110.0	180.0 - 180.0

Species	No.	No.	No.	No.
Alosa aestivalis	-	-	1	2
Alosa pseudoharengus	-	-	1	-
Brevoortia tyrannus	-	-	2	-
Anchoa mitchilli	-	2	19	2
Cyprinodon variegatus	-	-	1	-
Fundulus heteroclitus	-	10	18	15
Fundulus majalis	-	10	2	1
Menidia beryllina	-	2	4	-
Menidia menidia	19	187	62	2532
Apeltes quadracus	-	51	58	119
Syngnathus fuscus	3	7	8	8
Tautoga onitis	-	11	2	-
Tautogolabrus adspersus	-	-	1	-
Gobiosoma bosci	-	2	9	1
Etropus microstomus	-	2	1	-
Scophthalmus aquosus	-	1	-	-
Pseudopleuronectes americanus	4	67	24	2
Trinectes maculatus	-	-	1	-
Crangon septemspinosa	2537	7291	9384	1304
Callinectes sapidus	1	12	74	1
Callinectes similis	2	-	-	-
Total Specimens	2566	7655	9672	3987
Total Collections	6	12	12	6

Table 20. (cont.)

Location		Cedar Creek	Forked River	Oyster Creek	Double Creek
		JANUARY 1979			
Temperature:	air	-4.5 - -4.5	-5.0 - -2.5	-7.0 - -2.0	-1.5 - -1.0
	Surface	0.5 - 0.5	0.3 - 1.7	3.3 - 5.0	1.0 - 1.6
	Bottom	0.0 - 0.0	0.5 - 0.5	4.5 - 4.5	0.0 - 0.0
Salinity:	Surface	12.0 - 16.0	15.0 - 21.0	10.0 - 20.0	20.5 - 22.0
	Bottom	12.0 - 15.5	19.0 - 19.0	20.0 - 20.0	21.0 - 22.0
Oxygen:	Surface	11.0 - 11.1	10.8 - 12.8	10.8 - 12.1	11.6 - 12.2
	Bottom	11.1 - 11.1	11.9 - 11.9	11.1 - 11.1	11.7 - 11.7
pH:	Surface	7.8 - 7.9	7.3 - 8.0	6.8 - 7.8	7.9 - 8.0
	Bottom	7.8 - 7.8	7.9 - 7.9	7.9 - 7.9	7.8 - 7.9
Secchi (cm.)		120.0 - 120.0	100.0 - 100.0	80.0 - 80.0	100.0 - 100.0
Species		No.	No.	No.	No.
Anguilla rostrata		-	1	1	-
Alosa aestivalis		-	8	251	-
Alosa pseudoharengus		-	-	15	-
Alosa sapidissima		-	-	12	-
Anchoa mitchilli		1	-	-	-
Opsanus tau		-	-	2	-
Fundulus heteroclitus		-	2	17	-
Fundulus majalis		-	-	-	1
Menidia menidia		1	8	58	10
Apeltes quadracus		4	61	83	47
Syngnathus fuscus		-	2	-	2
Tautoga onitis		-	2	6	-
Gobiosoma bosci		-	1	-	-
Etropus microstomus		-	-	1	-
Pseudopleuronectes americanus		1	9	28	-
Crangon septemspinosa		4	872	7906	144
Callinectes sapidus		-	1	-	-
Total Specimens		11	967	8380	204
Total Collections		2	12	12	6

Table 20. (cont.)

Location		Cedar Creek	Forked River	Oyster Creek	Double Creek
		FEBRUARY 1979			
Temperature:	air	- - -	- - -	-1.0 - 4.0	- - -
	Surface	- - -	- - -	4.2 - 5.4	- - -
	Bottom	- - -	- - -	- - -	- - -
Salinity:	Surface	- - -	- - -	15.0 - 16.0	- - -
	Bottom	- - -	- - -	- - -	- - -
Oxygen:	Surface	- - -	- - -	10.6 - 11.4	- - -
	Bottom	- - -	- - -	- - -	- - -
pH:	Surface	- - -	- - -	7.6 - 7.7	- - -
	Bottom	- - -	- - -	- - -	- - -
Secchi (cm.)		- - -	- - -	- - -	- - -

Species	No.	No.	No.	No.
Alosa pseudoharengus	-	-	1	-
Fundulus heteroclitus	-	-	30	-
Menidia beryllina	-	-	22	-
Menidia menidia	-	-	42	-
Apeltes quadracus	-	-	29	-
Tautoga onitis	-	-	1	-
Tautogolabrus adspersus	-	-	1	-
Pseudopleuronectes americanus	-	-	1	-
Crangon septemspinosa	-	-	23	-
Total Specimens	0	0	150	0
Total Collections	0	0	8	0

Table 20. (cont.)

Location		Cedar Creek	Forked River	Oyster Creek	Double Creek
		MARCH 1979			
Temperature:	air	0.0 - 4.0	0.5 - 9.8	2.0 - 7.0	1.0 - 7.0
	Surface	3.5 - 4.8	4.8 - 11.0	8.4 - 13.0	5.2 - 5.8
	Bottom	3.5 - 3.5	6.2 - 10.0	8.5 - 12.0	5.2 - 5.2
Salinity:	Surface	4.0 - 12.0	11.0 - 16.0	9.0 - 16.0	16.0 - 16.0
	Bottom	9.5 - 10.0	13.5 - 14.0	10.0 - 13.0	16.0 - 17.0
Oxygen:	Surface	10.4 - 12.0	10.2 - 12.0	10.0 - 12.4	11.0 - 12.3
	Bottom	10.7 - 10.7	10.8 - 11.8	9.7 - 12.3	11.1 - 11.4
pH:	Surface	7.9 - 8.1	7.7 - 8.1	7.7 - 8.0	7.9 - 8.2
	Bottom	8.0 - 8.0	7.8 - 8.1	7.7 - 8.1	8.1 - 8.2
Secchi (cm)		87.0 - 87.0	77.0 - 77.0	120.0 - 120.0	100.0 - 100.0
Species		No.	No.	No.	No.
Anguilla rostrata		-	4	2	-
Alosa aestivalis		-	3	67	-
Alosa pseudoharengus		-	9	22	-
Alosa sapidissima		-	-	1	-
Anchoa mitchilli		-	-	1	-
Cyprinodon variegatus		-	2	7	1
Fundulus heteroclitus		1	9	35	4
Fundulus majalis		-	6	-	-
Menidia beryllina		9	2	1	3
Menidia menidia		17	6	466	2
Apeltes quadracus		9	44	57	11
Gasterosteus aculeatus		1	5	2	1
Syngnathus fuscus		1	-	-	-
Morone americana		-	2	1	-
Tautoga onitis		-	2	-	-
Ammodytes sp.		-	1	-	-
Gobiosoma bosci		-	-	1	-
Pseudopleuronectes americanus		4	40	93	16
Trinectes maculatus		-	-	2	-
Crangon septemspinosa		12	677	1292	411
Callinectes sapidus		-	23	14	-
Total Specimens		54	835	2064	449
Total Collections		6	12	12	6

Table 21 . Minimum, maximum, and mean length by month and location of a representative sample of Atlantic menhaden taken in Barnegat Bay from September 1978 through March 1979.

Month	Number	Length			
		Min.	Max.	Mean	Standard Deviation
		Oyster Creek			
December	2	175	205	190	-

Table 22 . Minimum, maximum, and mean length by month and location of a representative sample of bay anchovy taken in Barnegat Bay from September 1978 through March 1979.

Month	Number	Length			
		Min.	Max.	Mean	Standard Deviation
		Cedar Creek			
September	104	23	76	48	12.5
October	51	38	75	55	11.4
November	51	35	68	43	5.5
December	0	-	-	-	-
January	1	-	-	33	-
		Forked River			
September	113	28	78	50	10.9
October	196	34	79	50	11.0
November	96	25	62	43	6.4
December	2	34	38	36	-
		Oyster Creek			
September	16	46	76	62	9.2
October	92	30	80	47	10.2
November	20	35	56	45	5.2
December	19	32	58	40	7.7
January	0	-	-	-	-
February	0	-	-	-	-
March	1	-	-	44	-
		Double Creek			
September	50	28	62	42	5.5
October	50	35	71	53	8.6
November	62	39	73	47	7.1
December	2	38	43	41	-

Table 23. Minimum, maximum, and mean length by month and location of a representative sample of Atlantic silverside taken in Barnegat Bay from September 1978 through March 1979.

Month	Number	Length			
		Min.	Max.	Mean	Standard Deviation
Cedar Creek					
September	55	46	81	62	8.7
October	55	62	99	86	8.2
November	19	41	106	76	18.3
December	19	69	105	91	10.5
January	1	-	-	79	-
February	0	-	-	-	-
March	17	52	105	67	11.7
Forked River					
September	46	43	94	63	12.2
October	64	35	91	66	11.6
November	100	54	129	82	14.5
December	120	55	137	81	14.4
January	8	61	100	79	12.5
February	0	-	-	-	-
March	6	72	118	96	20.6
Oyster Creek					
September	59	41	76	63	8.4
October	61	52	98	72	12.5
November	82	30	107	72	12.7
December	62	52	145	81	20.2
January	57	58	117	83	15.5
February	42	59	110	84	14.7
March	67	62	142	94	18.2
Double Creek					
September	48	51	98	68	11.5
October	48	52	93	68	11.4
November	42	41	122	72	15.1
December	60	61	113	86	14.1
January	10	57	110	85	13.7
February	0	-	-	-	-
March	2	89	121	105	-

Table 24. Minimum, maximum, and mean length by month and location of a representative sample of threespine stickleback taken in Barnegat Bay from September 1978 through March 1979.

Month	Number	Length			
		Min.	Max.	Mean	Standard Deviation
		Cedar Creek			
March	1	-	-	65	-
		Forked River			
March	5	57	65	61	2.9
		Oyster Creek			
March	2	62	65	64	-
		Double Creek			
March	1	-	-	59	-

Table 25. Mimimum, maximum, and mean length by month and location of a representative sample of northern pipefish taken in Barnegat Bay from September 1978 through March 1979.

Month	Number	Length			
		Min.	Max.	Mean	Standard Deviation
		Cedar Creek			
September	6	100	173	135	29.5
October	1	-	-	135	-
November	14	106	210	141	29.9
December	2	119	150	135	-
January	0	-	-	-	-
February	0	-	-	-	-
March	1	-	-	167	-
		Forked River			
September	19	93	190	140	26.5
October	31	75	205	146	32.4
November	44	58	222	163	29.8
December	7	68	180	126	38.2
January	2	91	143	117	-
		Oyster Creek			
September	3	104	124	112	10.4
October	7	159	184	172	10.2
November	11	103	188	158	23.9
December	8	107	205	159	37.7
		Double Creek			
September	38	49	190	148	34.0
October	28	111	191	160	20.3
November	17	130	192	166	19.1
December	7	110	198	150	31.4
January	2	153	178	166	-

Table 26 . Minimum, maximum, and mean length by month and location of a representative sample of bluefish taken in Barnegat Bay from September 1978 through March 1979.

Month	Number	Length			
		Min.	Max.	Mean	Standard Deviation
		Cedar Creek			
September	2	130	141	136	-
October	1	-	-	123	-
		Forked River			
September	1	-	-	168	-
October	1	-	-	201	-
		Oyster Creek			
October	2	170	178	174	-
		Double Creek			
October	1	-	-	120	-

Table 27. Minimum, maximum, and mean length by month and location of a representative sample of weakfish taken in Barnegat Bay from September 1978 through March 1979.

Month	Number	Length			
		Min.	Max.	Mean	Standard Deviation
		Cedar Creek			
September	1	-	-	74	-
		Forked River			
September	33	38	115	70	18.1
October	34	80	139	109	13.9
November	1	-	-	54	-
		Oyster Creek			
September	6	87	215	152	55.9
October	11	65	220	128	40.2
		Double Creek			
September	1	-	-	71	-
October	3	100	130	111	16.5

Table 28. Minimum, maximum, and mean length by month and location of a representative sample of northern kingfish taken in Barnegat Bay from September 1978 through March 1979.

Month	Number	Length			
		Min.	Max.	Mean	Standard Deviation
		Forked River			
September	8	112	136	125	8.4
		Oyster Creek			
September	3	133	158	144	12.7

Table 29. Minimum, maximum, and mean length by month and location of a representative sample of summer flounder taken in Barnegat Bay from September 1978 through March 1979.

Month	Number	Length			
		Min.	Max.	Mean	Standard Deviation
		Cedar Creek			
September	1	-	-	240	-
October	1	-	-	250	-

Table 30 . Minimum, maximum, and mean length by month and location of a representative sample of winter flounder taken in Barnegat Bay from September 1978 through March 1979.

Month	Number	Length			
		Min.	Max.	Mean	Standard Deviation
		Cedar Creek			
September	1	-	-	63	-
October	0	-	-	-	-
November	1	-	-	92	-
December	4	90	315	165	101.8
January	1	-	-	110	-
February	0	-	-	-	-
March	4	121	270	209	70.1
		Forked River			
October	2	103	215	159	-
November	6	91	166	118	26.8
December	67	78	326	128	60.8
January	9	62	321	169	101.5
February	0	-	-	-	-
March	40	72	393	138	77.9
		Oyster Creek			
October	1	-	-	79	-
November	5	130	295	215	62.1
December	23	71	132	99	19.7
January	28	64	339	128	70.3
February	1	-	-	123	-
March	92	83	302	128	40.9
		Double Creek			
September	1	-	-	66	-
October	0	-	-	-	-
November	7	90	205	118	39.8
December	2	79	110	95	-
January	0	-	-	-	-
February	0	-	-	-	-
March	16	72	321	173	75.1

Table 31. Minimum, maximum, and mean length by month and location of a representative sample of northern puffer taken in Barnegat Bay from September 1978 through March 1979.

Month	Number	Length			
		Min.	Max.	Mean	Standard Deviation
		Forked River			
September	15	89	128	107	10.9
		Oyster Creek			
September	1	-	-	120	-
		Double Creek			
September	1	-	-	140	-

Table 32. Minimum, maximum, and mean length by month and location of a representative sample of sand shrimp taken in Barnegat Bay from September 1978 through March 1979.

Month	Number	Length			
		Min.	Max.	Mean	Standard Deviation
		Cedar Creek			
September	51	23	51	32	6.4
October	17	28	40	33	3.4
November	66	30	61	45	7.3
December	66	25	57	39	7.7
January	4	30	47	35	8.0
February	0	-	-	-	-
March	12	21	60	35	12.8
		Forked River			
September	19	17	34	26	5.4
October	136	14	49	29	6.7
November	171	19	59	40	8.7
December	186	22	64	43	9.0
January	116	18	63	34	9.6
February	0	-	-	-	-
March	188	12	60	32	10.7
		Oyster Creek			
September	0	-	-	-	-
October	88	17	44	28	5.4
November	140	17	65	35	8.7
December	212	21	65	46	9.1
January	200	12	66	38	11.9
February	17	22	51	36	8.1
March	201	19	61	35	9.2
		Double Creek			
September	55	19	45	31	5.8
October	28	28	51	39	7.1
November	100	22	58	42	8.0
December	126	21	67	39	9.2
January	51	21	51	31	7.3
February	0	-	-	-	-
March	102	16	58	32	7.4

Table 33 . Minimum, maximum, and mean length by month and location of a representative sample of blue crab taken in Barnegat Bay from September 1978 through March 1979.

Month	Number	Length			
		Min.	Max.	Mean	Standard Deviation
		Cedar Creek			
September	16	54	141	86	24.2
October	11	20	94	62	21.4
November	3	41	120	84	40.1
December	1	-	-	14	-
		Forked River			
September	35	19	150	63	31.6
October	35	14	150	68	45.3
November	17	10	47	32	11.7
December	12	14	58	31	15.9
January	1	-	-	38	-
February	0	-	-	-	-
March	23	10	130	37	24.2
		Oyster Creek			
September	48	9	156	59	32.0
October	52	5	141	38	36.4
November	39	5	184	46	39.7
December	72	5	188	38	27.5
January	0	-	-	-	-
February	0	-	-	-	-
March	14	17	114	60	28.9
		Double Creek			
September	42	12	130	72	25.9
October	25	43	153	98	30.9
November	7	8	87	57	27.6
December	1	-	-	22	-

Table 34. Seven-month estimate, with 80% confidence interval, of important and common macrozooplankton entrained at the Oyster Creek Generating Station from 1 September 1978 through 31 March 1979.[a]

TAXA (Lifestage)	ENTRAINMENT ESTIMATE	CONFIDENCE ± INTERVAL
Total Macrozooplankton	7.06×10^9	$\pm 1.64 \times 10^9$
Sarsia spp. (no determination)	8.96×10^8	$\pm 1.03 \times 10^9$
Total hydromedusae (no determination)	9.06×10^8	$\pm 1.03 \times 10^9$
Mnemiopsis leidyi (no determination)	5.02×10^8	$\pm 4.44 \times 10^8$
Total Ctenophora (no determination)	5.05×10^8	$\pm 4.45 \times 10^8$
Nereis spp. (no determination and epitokes)	3.74×10^6	$\pm 2.04 \times 10^6$
Total Polychaeta (larval)	1.84×10^8	$\pm 6.18 \times 10^7$
Total Polychaeta (no determination and gravid)	4.43×10^8	$\pm 3.20 \times 10^8$
Leucon americanus (no determination and gravid)	2.01×10^8	$\pm 7.53 \times 10^7$
Oxyurostylis smithi (no determination and gravid)	5.21×10^7	$\pm 2.58 \times 10^7$
Edotea triloba (no determination and gravid)	3.77×10^7	$\pm 1.81 \times 10^7$
Ampelisca spp. (no determination and gravid)	4.37×10^8	$\pm 1.96 \times 10^8$
Microdeutopus gryllotalpa (no determination and gravid)	1.67×10^8	$\pm 9.85 \times 10^7$
Corophium spp. (no determination and gravid)	6.91×10^7	$\pm 2.80 \times 10^7$
Caprellidea (no determination and gravid)	6.57×10^7	$\pm 3.29 \times 10^7$
Jassa falcata (no determination and gravid)	1.12×10^8	$\pm 7.39 \times 10^7$
Total Gammarus spp. (no determination and gravid)	3.20×10^8	$\pm 2.59 \times 10^8$
Total Amphipoda (no determination and gravid)	1.42×10^9	$\pm 4.42 \times 10^8$
Mysidopsis bigelowi (no determination)	2.85×10^7	$\pm 9.74 \times 10^6$
Mysidopsis bigelowi (gravid)	2.08×10^6	$\pm 1.64 \times 10^6$
Neomysis americana (no determination)	2.31×10^9	$\pm 5.95 \times 10^8$

Table 34. (cont.)

TAXA (Lifestage)	ENTRAINMENT ESTIMATE	CONFIDENCE ± INTERVAL
Neomysis americana (gravid)	7.57×10^6	$\pm 6.61 \times 10^6$
Palaemonetes spp. (zoeal)	3.47×10^6	$\pm 3.59 \times 10^6$
Crangon septemspinosa (zoeal)	5.57×10^8	$\pm 2.00 \times 10^8$
Crangon septemspinosa (no determination and gravid)	1.43×10^8	$\pm 3.40 \times 10^7$
Callinectes sapidus (megalopal)	2.40×10^6	$\pm 1.33 \times 10^6$
Panopeus herbstii (zoeal)	4.78×10^6	$\pm 4.39 \times 10^6$
Neopanope texana (zoeal)	8.66×10^6	$\pm 8.60 \times 10^6$
Total Xanthidae (zoeal)	1.53×10^7	$\pm 1.32 \times 10^7$
Total Sagitta spp. (no determination)	3.04×10^8	$\pm 1.88 \times 10^8$

[a] Estimates were based on data obtained from collections taken at the condenser discharge (Sta. 11), except for estimates of B. ovata and M. leidyi which were derived from data from collections at the condenser intake (Sta. 7).

Table 35. Mean monthly densities (n/1000 cubic meters) and frequency of occurrence of macrozooplankton taken in day and night collections at the OCGS discharge (Sta.11) 5 September 1978 through 26 March 1979.

		SEPTEMBER 78								
Species	Lifestage	Sample Frequency	Density Mean/Day	Std Dev	Sample Frequency	Density Mean/Night	Std Dev	Sample Frequency	Density Mean	Std Dev
Phylum Invertebrata	No Determ.	0	0.00	0.00	1	16.88	33.75	1	8.44	23.86
Class Hydrozoa	No Determ.	3	148.50	0.00	4	74.13	60.49	7	111.31	42.77
Order Actiniaria	No Determ.	3	73.75	0.00	2	19.00	22.39	5	46.38	15.84
Phylum Ctenophora	No Determ.	0	0.00	0.00	1	16.88	33.75	1	8.44	23.86
Class Gastropoda	No Determ.	1	81.00	0.00	2	31.88	41.41	3	56.44	29.28
Class Gastropoda	Larval	3	219.00	0.00	3	1806.13	3520.19	6	1012.56	2489.15
Suborder Doridacea	No Determ.	0	0.00	0.00	3	55.13	59.17	3	27.56	41.84
Suborder Aeolidacea	No Determ.	2	44.75	0.00	3	45.88	34.96	5	45.31	24.72
Class Polychaeta	No Determ.	4	75.50	0.00	2	59.50	75.22	6	67.50	53.19
Class Polychaeta	Larval	1	11.25	0.00	0	0.00	0.00	1	5.63	0.00
Family Phyllodocidae	No Determ.	0	0.00	0.00	3	37.00	42.88	3	18.50	30.32
Family Syllidae	No Determ.	0	0.00	0.00	2	29.88	41.05	2	14.94	29.03
Podarke obscura	No Determ.	1	9.75	0.00	0	0.00	0.00	1	4.88	0.00
Nereis spp	Epitokes	0	0.00	0.00	4	59.00	69.82	4	29.50	49.37
Nereis spp	No Determ.	0	0.00	0.00	1	8.13	16.25	1	4.06	11.49
Family Spionidae	No Determ.	0	0.00	0.00	1	58.63	117.25	1	29.31	82.91
Polydora spp	No Determ.	3	73.75	0.00	4	86.38	108.80	7	80.06	76.93
Sabellaria vulgaris	No Determ.	0	0.00	0.00	1	16.88	33.75	1	8.44	23.86
Scoloplos spp	No Determ.	0	0.00	0.00	2	31.88	41.41	2	15.94	29.28
Order Sabellida	No Determ.	0	0.00	0.00	1	28.63	57.25	1	14.31	40.48
Sabella microphthalma	No Determ.	1	11.25	0.00	1	10.38	20.75	2	10.81	14.67
Family Serpulidae	No Determ.	0	0.00	0.00	1	19.50	39.00	1	9.75	27.58
Hydroides dianthus	No Determ.	3	64.00	0.00	0	0.00	0.00	3	32.00	0.00
Subphylum Pycnogonida	No Determ.	2	33.25	0.00	5	153.38	147.95	7	93.31	104.61
Argulus spp	No Determ.	0	0.00	0.00	1	17.38	34.75	1	8.69	24.57
Cyclaspis varians	No Determ.	2	34.00	0.00	7	636.25	554.61	9	335.13	392.17
Leucon americanus	No Determ.	0	0.00	0.00	8	2788.25	1269.90	8	1394.13	897.96
Leucon americanus	Gravid Fe.	0	0.00	0.00	2	26.38	32.75	2	13.19	23.16
Oxyurostylis smithi	No Determ.	2	68.50	0.00	8	1370.00	584.56	10	719.25	413.35
Idotea baltica	No Determ.	3	43.75	0.00	7	124.75	47.99	10	84.25	33.94
Idotea baltica	Gravid Fe.	2	19.75	0.00	0	0.00	0.00	2	9.88	0.00
Idotea triloba	No Determ.	4	128.00	0.00	7	657.00	639.49	11	392.50	452.18
Order Amphipoda	No Determ.	3	97.25	0.00	7	395.63	133.07	10	246.44	94.10
Ampelisca spp.	No Determ.	4	352.25	0.00	8	4146.50	1988.62	12	2249.38	1406.17
Ampelisca spp.	Gravid Fe.	2	21.00	0.00	7	150.00	129.41	9	85.50	91.50
Microdeutopus gryllotalpa	No Determ.	4	52.75	0.00	2	64.63	90.06	6	58.69	63.68
Microdeutopus gryllotalpa	Gravid Fe.	0	0.00	0.00	1	8.13	16.25	1	4.06	11.49
Unciola spp	No Determ.	1	9.75	0.00	3	51.38	39.73	4	30.56	28.09
Cerapus tubularis	No Determ.	4	96.75	0.00	3	96.13	149.55	7	96.44	105.75
Corophium acherusicum	No Determ.	1	19.50	0.00	0	0.00	0.00	1	9.75	0.00
Corophium spp	No Determ.	1	10.00	0.00	1	19.50	39.00	2	14.75	27.58
Family Gammaridae	No Determ.	1	9.75	0.00	1	8.13	16.25	2	8.94	11.49
Gammarus mucronatus	No Determ.	1	9.75	0.00	1	20.38	40.75	2	15.06	28.81

Table 35. (cont.)

Species	Lifestage	Sample Frequency	Density Mean/Day	Std Dev	Sample Frequency	Density Mean/Night	Std Dev	Sample Frequency	Density Mean	Std Dev
Jassa falcata	No Determ.	4	1320.00	0.00	8	2407.13	1209.90	12	1863.56	855.53
Jassa falcata	Gravid Fe.	3	70.75	0.00	2	99.00	198.00	5	84.88	140.01
Listriella barnardi	No Determ.	0	0.00	0.00	2	31.88	41.41	2	15.94	29.28
Elasmopus levis	No Determ.	3	86.00	0.00	7	205.88	149.10	10	145.94	105.43
Elasmopus levis	Gravid Fe.	0	0.00	0.00	1	10.13	20.25	1	5.06	14.32
Melita nitida	No Determ.	2	79.25	0.00	6	367.50	349.58	8	223.38	247.19
Monoculodes edwardsi	No Determ.	0	0.00	0.00	3	56.75	38.30	3	28.38	27.08
Microprotopus raneyi	No Determ.	0	0.00	0.00	2	42.38	84.75	2	21.19	59.93
Microprotopus raneyi	Gravid Fe.	0	0.00	0.00	1	21.75	43.50	1	10.88	30.76
Family Stenothoidae	No Determ.	4	1352.25	0.00	8	1283.13	475.93	12	1317.69	336.53
Family Stenothoidae	Gravid Fe.	0	0.00	0.00	1	16.88	33.75	1	8.44	23.86
Parametopella cypris	No Determ.	1	20.00	0.00	2	27.25	36.23	3	23.63	25.62
Parametopella cypris	Gravid Fe.	1	9.75	0.00	0	0.00	0.00	1	4.88	0.00
Stenothoe minuta	No Determ.	1	173.50	0.00	4	119.25	107.82	5	146.38	76.24
Stenothoe minuta	Gravid Fe.	1	11.50	0.00	0	0.00	0.00	1	5.75	0.00
Stenothoe brevicornis	No Determ.	0	0.00	0.00	1	17.38	34.75	1	8.69	24.57
Suborder Caprellidea	No Determ.	4	304.00	0.00	8	1431.25	838.27	12	867.63	592.75
Suborder Caprellidea	Gravid Fe.	2	21.25	0.00	2	38.00	44.20	4	29.63	31.25
Family Mysidae	No Determ.	1	11.50	0.00	0	0.00	0.00	1	5.75	0.00
Mysidopsis bigelowi	No Determ.	1	11.50	0.00	7	490.38	64.74	8	250.94	45.78
Mysidopsis bigelowi	Gravid Fe.	0	0.00	0.00	4	67.63	63.01	4	33.81	44.55
Neomysis americana	No Determ.	3	166.75	0.00	8	5932.63	2068.48	11	3049.69	1462.64
Neomysis americana	Gravid Fe.	1	10.00	0.00	0	0.00	0.00	1	5.00	0.00
Palaemonetes pugio	No Determ.	1	10.00	0.00	0	0.00	0.00	1	5.00	0.00
Palaemonetes spp	No Determ.	1	11.25	0.00	1	20.38	40.75	2	15.81	28.81
Palaemonetes spp	Zoeal	2	21.25	0.00	2	88.38	176.75	4	54.81	124.98
Hippolyte spp.	Zoeal	1	11.50	0.00	0	0.00	0.00	1	5.75	0.00
Crangon septemspinosa	No Determ.	0	0.00	0.00	3	41.63	60.62	3	20.81	42.87
Pagurus sp	Zoeal	3	67.25	0.00	2	49.63	99.25	5	58.44	70.18
Infraorder Brachyura	Megalopal	0	0.00	0.00	5	82.00	95.59	5	41.00	67.59
Ovalipes ocellatus	Zoeal	1	9.75	0.00	0	0.00	0.00	1	4.88	0.00
Callinectes sapidus	Megalopal	1	11.50	0.00	4	80.88	37.95	5	46.19	26.84
Callinectes sapidus	Juvenile	0	0.00	0.00	1	10.88	21.75	1	5.44	15.38
Family Xanthidae	Zoeal	0	0.00	0.00	2	42.38	84.75	2	21.19	59.93
Panopeus herbstii	Zoeal	3	89.25	0.00	2	53.00	82.63	5	71.13	58.43
Neopanope sayi	Zoeal	4	184.50	0.00	3	69.63	92.79	7	127.06	65.61
Eurypanopeus depressus	Zoeal	0	0.00	0.00	1	17.38	34.75	1	8.69	24.57
Family Molgulidae	No Determ.	2	19.75	0.00	0	0.00	0.00	2	9.88	0.00
Total								12	16185.06	

Total Number of Forms = 81

Table 35. (cont.)

DECEMBER 78

Species	Lifestage	Sample Frequency	Density Mean/Day	Std Dev	Sample Frequency	Density Mean/Night	Std Dev	Sample Frequency	Density Mean	Std Dev
Phylum Invertebrata	No Determ.	1	55.00	0.00	2	78.40	175.31	3	66.70	123.96
Order Actiniaria	No Determ.	4	1197.75	0.00	5	262.10	342.86	9	729.93	242.44
Class Bivalvia	No Determ.	1	89.25	0.00	3	107.40	134.70	4	98.33	95.25
Class Polychaeta	No Determ.	4	5051.75	0.00	6	1069.30	1172.42	10	3060.53	829.03
Class Polychaeta	Larval	2	151.25	0.00	2	193.40	432.46	4	172.33	305.79
Family Phyllodocidae	No Determ.	1	92.50	0.00	0	0.00	0.00	1	46.25	0.00
Family Polynoidae	No Determ.	1	23.25	0.00	0	0.00	0.00	1	11.63	0.00
Family Syllidae	Larval	1	55.00	0.00	0	0.00	0.00	1	27.50	0.00
Autolytus spp	Gravid Fe.	0	0.00	0.00	1	16.10	36.00	1	8.05	25.46
Nereis spp	No Determ.	0	0.00	0.00	1	22.00	49.19	1	11.00	34.79
Family Capitellidae	No Determ.	4	1759.25	0.00	5	393.70	557.50	9	1076.48	394.21
Family Spionidae	No Determ.	0	0.00	0.00	1	109.90	245.74	1	54.95	173.77
Polydora spp	No Determ.	3	236.75	0.00	3	159.00	329.62	6	197.88	233.08
Class Hirudinea	No Determ.	0	0.00	0.00	1	73.40	164.13	1	36.70	116.06
Subphylum Pycnogonida	No Determ.	1	58.75	0.00	0	0.00	0.00	1	29.38	0.00
Cyclaspis varians	No Determ.	1	55.00	0.00	2	56.90	83.19	3	55.95	58.83
Leucon americanus	No Determ.	4	1235.75	0.00	8	1040.60	650.02	12	1138.18	459.63
Oxyurostylis smithi	No Determ.	0	0.00	0.00	5	107.10	72.80	5	53.55	51.48
Edotea triloba	No Determ.	1	176.50	0.00	7	142.70	123.20	8	159.60	87.12
Order Amphipoda	No Determ.	1	110.00	0.00	6	237.70	262.69	7	173.85	185.75
Ampelisca spp.	No Determ.	4	4142.00	0.00	10	1373.20	1143.22	14	2757.60	808.38
Microdeutopus gryllotalpa	No Determ.	4	2232.50	0.00	9	559.00	419.55	13	1395.75	296.66
Microdeutopus gryllotalpa	Gravid Fe.	0	0.00	0.00	1	22.50	50.31	1	11.25	35.58
Unciola spp	No Determ.	1	55.00	0.00	0	0.00	0.00	1	27.50	0.00
Cerapus tubularis	No Determ.	1	58.75	0.00	1	10.10	22.58	2	34.43	15.97
Corophium acherusicum	No Determ.	1	55.00	0.00	3	49.30	49.01	4	52.15	34.65
Corophium acherusicum	Gravid Fe.	0	0.00	0.00	1	10.10	22.58	1	5.05	15.97
Corophium tuberculatum	No Determ.	1	117.75	0.00	3	125.50	184.67	4	121.63	130.58
Corophium spp	No Determ.	2	199.25	0.00	3	97.90	137.44	5	148.58	97.19
Family Gammaridae	No Determ.	0	0.00	0.00	5	248.30	170.59	5	124.15	120.63
Marinogammarus sp	No Determ.	0	0.00	0.00	1	16.10	36.00	1	8.05	25.46
Elasmopus levis	No Determ.	2	269.00	0.00	6	252.40	193.47	8	260.70	136.80
Melita nitida	No Determ.	4	354.50	0.00	9	356.10	269.12	13	355.30	190.30
Monoculodes edwardsi	No Determ.	0	0.00	0.00	5	165.20	219.14	5	82.60	154.95
Microprotopus raneyi	No Determ.	0	0.00	0.00	1	14.00	31.30	1	7.00	22.14
Stenothoe minuta	No Determ.	0	0.00	0.00	2	167.10	373.65	2	83.55	264.21
Suborder Caprellidea	No Determ.	1	89.25	0.00	0	0.00	0.00	1	44.63	0.00
Mysidopsis bigelowi	No Determ.	0	0.00	0.00	5	173.70	238.83	5	86.85	168.88
Neomysis americana	No Determ.	3	696.25	0.00	10	6834.00	6975.48	13	3765.13	4932.41
Palaemonetes vulgaris	No Determ.	2	239.50	0.00	7	155.70	168.95	9	197.60	119.47
Crangon septemspinosa	Zoeal	4	770.25	0.00	10	1863.10	1579.94	14	1316.68	1117.19

Table 35. (cont.)

Species	Lifestage	Sample Frequency	Density Mean/Day	Std Dev	Sample Frequency	Density Mean/Night	Std Dev	Sample Frequency	Density Mean	Std Dev
Crangon septemspinosa	No Determ.	2	206.50	0.00	8	902.70	829.67	10	554.60	586.67
Sagitta spp.	No Determ.	1	110.00	0.00	5	480.20	737.97	6	295.10	521.82
Family Molgulidae	No Determ.	1	14.75	0.00	2	30.00	43.45	3	22.38	30.72
Total								14	18966.95	

Total Number of Forms = 44

Table 35. (cont.)

JANUARY 79

Species	Lifestage	Sample Frequency	Density Mean/Day	Std Dev	Sample Frequency	Density Mean/Night	Std Dev	Sample Frequency	Density Mean	Std Dev
Class Hydrozoa	No Determ.	0	0.00	0.00	1	32.33	56.00	1	16.17	39.60
Margelopsis gibbesi	No Determ.	0	0.00	0.00	1	7.00	12.12	1	3.50	8.57
Obelia spp	No Determ.	0	0.00	0.00	1	32.33	56.00	1	16.17	39.60
Order Actiniaria	No Determ.	0	0.00	0.00	2	23.33	25.17	2	11.67	17.80
Order Ceriantharia	Larval	1	16.75	0.00	2	39.00	51.22	3	27.88	36.21
Mnemiopsis leidyi	No Determ.	0	0.00	0.00	1	32.33	56.00	1	16.17	39.60
Suborder Aeolidacea	No Determ.	1	36.25	0.00	0	0.00	0.00	1	18.13	0.00
Class Bivalvia	No Determ.	1	16.75	0.00	3	46.00	48.69	4	31.38	34.43
Class Polychaeta	No Determ.	2	53.00	0.00	3	178.83	171.75	5	115.92	121.45
Class Polychaeta	Larval	4	1318.00	0.00	4	718.50	717.37	8	1018.25	507.26
Tomopteris helgolandica	No Determ.	0	0.00	0.00	1	64.67	112.01	1	32.33	79.20
Family Polynoidae	No Determ.	0	0.00	0.00	1	7.00	12.12	1	3.50	8.57
Family Syllidae	Larval	0	0.00	0.00	1	32.33	56.00	1	16.17	39.60
Family Syllidae	No Determ.	1	28.75	0.00	0	0.00	0.00	1	14.38	0.00
Family Capitellidae	No Determ.	0	0.00	0.00	2	98.00	169.74	2	49.00	120.02
Polydora spp	No Determ.	1	36.25	0.00	1	6.67	11.55	2	21.46	8.16
Spirorbis spp	No Determ.	1	16.75	0.00	0	0.00	0.00	1	8.38	0.00
Class Oligochaeta	No Determ.	0	0.00	0.00	1	6.67	11.55	1	3.33	8.16
Class Hirudinea	No Determ.	1	50.00	0.00	2	271.33	469.96	3	160.67	332.31
Mysidobdella oculata	No Determ.	0	0.00	0.00	3	74.50	46.63	3	37.25	32.97
Cyclaspis varians	No Determ.	0	0.00	0.00	1	16.67	28.87	1	8.33	20.41
Leucon americanus	No Determ.	0	0.00	0.00	5	173.67	84.36	5	86.83	59.65
Oxyurostylis smithi	No Determ.	1	28.75	0.00	1	7.00	12.12	2	17.88	8.57
Idotea baltica	No Determ.	0	0.00	0.00	1	7.00	12.12	1	3.50	8.57
Order Amphipoda	No Determ.	0	0.00	0.00	3	84.17	75.52	3	42.08	53.40
Ampelisca spp.	No Determ.	1	18.50	0.00	5	111.50	81.17	6	65.00	57.39
Microdeutopus gryllotalpa	No Determ.	0	0.00	0.00	3	60.83	53.40	3	30.42	37.76
Corophium acherusicum	No Determ.	2	91.00	0.00	1	16.67	28.87	3	53.83	20.41
Corophium tuberculatum	No Determ.	1	18.00	0.00	1	7.00	12.12	2	12.50	8.57
Family Gammaridae	No Determ.	2	47.25	0.00	2	298.33	498.65	4	172.79	352.60
Gammarus annulatus	Gravid Fe.	0	0.00	0.00	2	27.00	46.77	2	13.50	33.07
Gammarus annulatus	No Determ.	0	0.00	0.00	2	218.67	378.74	2	109.33	267.81
Gammarus mucronatus	No Determ.	0	0.00	0.00	2	81.67	141.45	2	40.83	100.02
Gammarus spp	No Determ.	0	0.00	0.00	1	13.83	23.96	1	6.92	16.94
Marinogammarus sp	No Determ.	0	0.00	0.00	2	52.17	53.28	2	26.08	37.68
Elasmopus levis	No Determ.	0	0.00	0.00	1	16.67	28.87	1	8.33	20.41
Melita nitida	No Determ.	0	0.00	0.00	1	6.67	11.55	1	3.33	8.16
Monoculodes edwardsi	No Determ.	0	0.00	0.00	5	140.33	56.71	5	70.17	40.10
Microprotopus raneyi	No Determ.	1	28.75	0.00	0	0.00	0.00	1	14.38	0.00
Family Stenothoidae	No Determ.	1	16.75	0.00	0	0.00	0.00	1	8.38	0.00
Stenothoe minuta	No Determ.	1	18.00	0.00	0	0.00	0.00	1	9.00	0.00
Suborder Caprellidea	No Determ.	2	47.25	0.00	0	0.00	0.00	2	23.63	0.00
Mysidopsis bigelowi	No Determ.	2	75.50	0.00	2	65.33	113.16	4	70.42	80.02
Neomysis americana	No Determ.	4	7396.25	0.00	6	18070.00	24582.36	10	12733.13	17382.36

Table 35. (cont.)

Species	Lifestage	Sample Frequency	Density Mean/Day	Std Dev	Sample Frequency	Density Mean/Night	Std Dev	Sample Frequency	Density Mean	Std Dev
Palaemonetes vulgaris	No Determ.	0	0.00	0.00	3	43.50	41.43	3	21.75	29.30
Crangon septemspinosa	Zoeal	4	2258.00	0.00	6	1931.67	780.13	10	2094.83	551.63
Crangon septemspinosa	No Determ.	1	16.75	0.00	6	1279.67	657.58	7	648.21	464.98
Sagitta spp.	No Determ.	4	3374.50	0.00	6	6158.83	3834.73	10	4766.67	2711.56
Total								10	22783.71	

Total Number of Forms = 48

Table 35. (cont.)

FEBRUARY 79

Species	Lifestage	Sample Frequency	Density Mean/Day	Std Dev	Sample Frequency	Density Mean/Night	Std Dev	Sample Frequency	Density Mean	Std Dev
Phylum Invertebrata	No Determ.	0	0.00	0.00	1	6.25	15.31	1	3.13	10.83
Margelopsis gibbesi	No Determ.	0	0.00	0.00	1	16.33	40.01	1	8.17	28.29
Sarsia spp	No Determ.	2	23.50	0.00	6	40.67	40.92	8	32.08	28.93
Order Actiniaria	No Determ.	1	21.25	0.00	4	27.58	32.99	5	24.42	23.33
Order Cerianthania	Larval	0	0.00	0.00	1	8.17	20.00	1	4.08	14.15
Class Nematoda	No Determ.	0	0.00	0.00	1	9.33	22.86	1	4.67	16.17
Crepidula spp	No Determ.	0	0.00	0.00	1	3.75	9.19	1	1.88	6.50
Suborder Aeolidacea	No Determ.	0	0.00	0.00	2	13.25	32.46	2	6.63	22.95
Class Bivalvia	No Determ.	3	45.50	0.00	5	45.08	69.95	8	45.29	49.46
Class Polychaeta	No Determ.	0	0.00	0.00	6	117.00	181.01	6	58.50	127.99
Class Polychaeta	Larval	4	398.75	0.00	11	841.50	1153.99	15	620.13	815.99
Paranaitis spp	Larval	1	11.75	0.00	0	0.00	0.00	1	5.88	0.00
Family Polynoidae	No Determ.	1	10.50	0.00	4	27.50	42.48	5	19.00	30.03
Family Polynoidae	Larval	0	0.00	0.00	1	12.42	30.41	1	6.21	21.51
Glycera spp	No Determ.	1	11.75	0.00	0	0.00	0.00	1	5.88	0.00
Family Syllidae	No Determ.	4	203.50	0.00	7	157.58	206.95	11	180.54	146.33
Family Syllidae	Gravid Fe.	0	0.00	0.00	1	8.67	21.23	1	4.33	15.01
Autolytus spp	No Determ.	1	11.75	0.00	3	13.92	17.52	4	12.83	12.39
Autolytus spp	Gravid Fe.	0	0.00	0.00	1	3.92	9.59	1	1.96	6.78
Sphaerosyllis erinaceus	No Determ.	2	22.25	0.00	5	64.25	84.00	7	43.25	59.39
Brania clavata	No Determ.	1	21.25	0.00	0	0.00	0.00	1	10.63	0.00
Exogone dispar	No Determ.	1	11.75	0.00	1	7.50	18.37	2	9.63	12.99
Gyptis vittata	No Determ.	1	11.75	0.00	1	11.92	29.19	2	11.83	20.64
Family Capitellidae	No Determ.	4	78.75	0.00	9	448.00	746.05	13	263.38	527.53
Polydora spp	No Determ.	2	22.50	0.00	1	6.25	15.31	3	14.38	10.83
Scolecolepides viridis	No Determ.	0	0.00	0.00	1	3.08	7.55	1	1.54	5.34
Stauronereis rudolphi	No Determ.	0	0.00	0.00	1	3.08	7.55	1	1.54	5.34
Family Terebellidae	No Determ.	0	0.00	0.00	1	6.92	16.94	1	3.46	11.98
Class Hirudinea	No Determ.	0	0.00	0.00	3	19.00	23.55	3	9.50	16.65
Mysidobdella oculata	No Determ.	2	22.50	0.00	7	131.42	139.14	9	76.96	98.38
Subphylum Pycnogonida	No Determ.	0	0.00	0.00	3	16.92	26.85	3	8.46	18.99
Subclass Cirripedia	Cyprids	4	996.25	0.00	6	467.08	569.94	10	731.67	403.01
Cyclaspis varians	No Determ.	0	0.00	0.00	1	8.17	20.00	1	4.08	14.15
Leptocuma minor	No Determ.	0	0.00	0.00	1	15.67	38.38	1	7.83	27.14
Leucon americanus	No Determ.	1	23.75	0.00	10	119.75	62.33	11	71.75	44.08
Oxyurostylis smithi	No Determ.	0	0.00	0.00	3	13.75	16.95	3	6.88	11.98
Cyathura spp	No Determ.	0	0.00	0.00	1	3.42	8.37	1	1.71	5.92
Idotea baltica	No Determ.	0	0.00	0.00	2	6.67	10.37	2	3.33	7.33
Edotea triloba	No Determ.	2	34.00	0.00	2	10.00	24.49	4	22.00	17.32
Order Amphipoda	No Determ.	3	56.25	0.00	6	61.75	59.69	9	59.00	42.21
Ampelisca spp.	No Determ.	4	662.00	0.00	9	269.75	208.24	13	465.88	147.25
Family Aoridae	No Determ.	2	54.00	0.00	1	12.67	31.03	3	33.33	21.94
Microdeutopus gryllotalpa	No Determ.	4	359.50	0.00	10	234.25	225.57	14	296.88	159.50

Table 35. (cont.)

Species	Lifestage	Sample Frequency	Density Mean/Day	Std Dev	Sample Frequency	Density Mean/Night	Std Dev	Sample Frequency	Density Mean	Std Dev
Unciola serrata	No Determ.	1	11.75	0.00	1	3.08	7.55	2	7.42	5.34
Lembos websteri	No Determ.	0	0.00	0.00	1	7.17	17.55	1	3.58	12.41
Cerapus tubularis	No Determ.	1	11.75	0.00	0	0.00	0.00	1	5.88	0.00
Corophium acherusicum	No Determ.	0	0.00	0.00	2	10.00	17.11	2	5.00	12.10
Corophium insidiosum	No Determ.	1	11.75	0.00	0	0.00	0.00	1	5.88	0.00
Corophium tuberculatum	No Determ.	3	111.75	0.00	8	108.17	112.18	11	109.96	79.32
Corophium spp	No Determ.	0	0.00	0.00	2	15.08	23.49	2	7.54	16.61
Erichthonius brasiliensis	No Determ.	1	11.75	0.00	0	0.00	0.00	1	5.88	0.00
Erichthonius spp	No Determ.	1	10.50	0.00	0	0.00	0.00	1	5.25	0.00
Family Gammaridae	No Determ.	0	0.00	0.00	5	148.83	228.12	5	74.42	161.30
Family Gammaridae	Gravid Fe.	0	0.00	0.00	2	21.17	51.85	2	10.58	36.66
Gammarus annulatus	No Determ.	0	0.00	0.00	7	201.00	203.78	7	100.50	144.09
Gammarus annulatus	Gravid Fe.	0	0.00	0.00	7	113.42	158.28	7	56.71	111.92
Gammarus mucronatus	No Determ.	1	10.75	0.00	8	59.58	34.20	9	35.17	24.18
Gammarus mucronatus	Gravid Fe.	0	0.00	0.00	1	3.08	7.55	1	1.54	5.34
Gammarus spp	No Determ.	1	10.75	0.00	6	532.67	1009.19	7	271.71	713.60
Gammarus spp	Gravid Fe.	0	0.00	0.00	2	19.42	31.23	2	9.71	22.08
Jassa falcata	No Determ.	0	0.00	0.00	2	10.00	17.11	2	5.00	12.10
Orchomenella penguis	No Determ.	0	0.00	0.00	1	16.33	40.01	1	8.17	28.29
Elasmopus levis	No Determ.	3	44.75	0.00	3	21.92	29.31	6	33.33	20.72
Melita nitida	No Determ.	1	10.75	0.00	4	40.17	49.96	5	25.46	35.33
Monoculodes edwardsi	No Determ.	1	10.50	0.00	11	224.58	189.33	12	117.54	133.88
Microprotopus raneyi	No Determ.	0	0.00	0.00	2	14.75	22.92	2	7.38	16.20
Family Stenothoidae	No Determ.	1	11.75	0.00	0	0.00	0.00	1	5.88	0.00
Stenothoe minuta	No Determ.	1	10.75	0.00	2	11.42	19.44	3	11.08	13.74
Suborder Caprellidea	No Determ.	3	34.25	0.00	3	20.33	22.37	6	27.29	15.82
Mysidopsis bigelowi	No Determ.	0	0.00	0.00	2	60.17	147.38	2	30.08	104.21
Neomysis americana	No Determ.	4	2845.25	0.00	12	15930.33	10226.50	16	9387.79	7231.23
Neomysis americana	Gravid Fe.	0	0.00	0.00	1	6.25	15.31	1	3.13	10.83
Order Decapoda	Zoeal	0	0.00	0.00	1	8.17	20.00	1	4.08	14.15
Infraorder Caridea	Zoeal	0	0.00	0.00	1	8.67	21.23	1	4.33	15.01
Palaemonetes vulgaris	No Determ.	0	0.00	0.00	8	95.00	90.12	8	47.50	63.72
Palaemonetes spp	No Determ.	0	0.00	0.00	2	12.58	21.48	2	6.29	15.19
Crangon septemspinosa	No Determ.	0	0.00	0.00	12	584.83	567.58	12	292.42	401.34
Crangon septemspinosa	Zoeal	4	585.50	0.00	12	799.50	483.97	16	692.50	342.22
Sagitta spp.	No Determ.	2	35.50	0.00	11	379.00	530.26	13	207.25	374.95
Class Holothuroidea	No Determ.	1	11.75	0.00	1	6.92	16.94	2	9.33	11.98
Total								16	14847.00	

Total Number of Forms = 80

Table 35. (cont.)

MARCH 79

Species	Lifestage	Sample Frequency	Density Mean/Day	Std Dev	Sample Frequency	Density Mean/Night	Std Dev	Sample Frequency	Density Mean	Std Dev
Class Hydrozoa	No Determ.	0	0.00	0.00	1	9.30	20.80	1	4.65	14.70
Sarsia spp	No Determ.	2	73.50	0.00	7	28355.80	53639.87	9	14214.65	37929.12
Obelia spp	No Determ.	0	0.00	0.00	1	8.30	18.56	1	4.15	13.12
Order Actiniaria	No Determ.	0	0.00	0.00	4	41.50	38.06	4	20.75	26.91
Order Ceriantharia	Larval	0	0.00	0.00	2	34.90	78.04	2	17.45	55.18
Suborder Aeolidacea	No Determ.	0	0.00	0.00	1	34.90	78.04	1	17.45	55.18
Class Bivalvia	No Determ.	1	12.00	0.00	7	443.10	506.80	8	227.55	358.36
Class Polychaeta	Larval	4	709.50	0.00	8	943.80	827.54	12	826.65	585.16
Family Phyllodocidae	No Determ.	1	23.50	0.00	1	9.30	20.80	2	16.40	14.70
Eteone heteropoda	No Determ.	0	0.00	0.00	1	4.10	9.17	1	2.05	6.48
Family Polynoidae	No Determ.	0	0.00	0.00	1	9.00	20.12	1	4.50	14.23
Family Syllidae	No Determ.	0	0.00	0.00	3	298.90	575.17	3	149.45	406.71
Autolytus spp	No Determ.	0	0.00	0.00	1	4.10	9.17	1	2.05	6.48
Podarke obscura	No Determ.	2	33.25	0.00	0	0.00	0.00	2	16.63	0.00
Gyptis vittata	No Determ.	1	12.00	0.00	0	0.00	0.00	1	6.00	0.00
Nereis spp	No Determ.	1	16.75	0.00	2	13.40	20.07	3	15.08	14.19
Family Capitellidae	No Determ.	0	0.00	0.00	2	123.50	230.38	2	61.75	162.90
Polydora spp	No Determ.	0	0.00	0.00	3	681.00	1379.40	3	340.50	975.39
Class Oligochaeta	No Determ.	0	0.00	0.00	3	51.50	47.38	3	25.75	33.50
Mysidobdella oculata	No Determ.	1	50.00	0.00	6	197.40	198.35	7	123.70	140.25
Subclass Cirripedia	Cyprids	4	859.25	0.00	9	1275.80	554.54	13	1067.53	392.12
Cyclaspis varians	No Determ.	0	0.00	0.00	2	34.90	78.04	2	17.45	55.18
Leucon americanus	No Determ.	3	61.50	0.00	9	968.90	821.53	12	515.20	580.91
Oxyurostylis smithi	No Determ.	0	0.00	0.00	4	158.10	126.40	4	79.05	89.38
Chiridotea coeca	No Determ.	0	0.00	0.00	1	4.40	9.84	1	2.20	6.96
Idotea baltica	No Determ.	0	0.00	0.00	3	39.80	54.80	3	19.90	38.75
Order Amphipoda	No Determ.	1	36.00	0.00	3	91.70	115.12	4	63.85	81.40
Ampelisca spp.	No Determ.	3	126.00	0.00	8	1634.30	1697.65	11	880.15	1200.42
Family Aoridae	No Determ.	2	56.75	0.00	3	50.70	46.59	5	53.73	32.94
Microdeutopus gryllotalpa	No Determ.	4	239.25	0.00	9	835.80	973.69	13	537.53	688.50
Microdeutopus gryllotalpa	Gravid Fe.	0	0.00	0.00	2	104.50	233.67	2	52.25	165.23
Leptocheris plumulosus	No Determ.	0	0.00	0.00	4	97.90	110.37	4	48.95	78.04
Cerapus tubularis	No Determ.	1	47.25	0.00	0	0.00	0.00	1	23.63	0.00
Corophium acherusicum	No Determ.	1	16.75	0.00	2	33.70	46.19	3	25.23	32.66
Corophium bonelli	No Determ.	0	0.00	0.00	1	9.00	20.12	1	4.50	14.23
Corophium tuberculatum	No Determ.	1	23.50	0.00	5	626.30	926.18	6	324.90	654.91
Corophium tuberculatum	Gravid Fe.	0	0.00	0.00	2	32.60	44.81	2	16.30	31.68
Corophium spp	No Determ.	1	16.75	0.00	5	169.10	221.63	6	92.93	156.72
Erichthonius spp	No Determ.	1	23.50	0.00	1	8.30	18.56	2	15.90	13.12
Gammarus annulatus	No Determ.	0	0.00	0.00	7	233.70	198.17	7	116.85	140.13
Gammarus annulatus	Gravid Fe.	0	0.00	0.00	3	195.50	342.06	3	97.75	241.87
Gammarus mucronatus	No Determ.	0	0.00	0.00	3	43.70	62.97	3	21.85	44.53

Table 35. (cont.)

Species	Lifestage	Sample Frequency	Density Mean/Day	Std Dev	Sample Frequency	Density Mean/Night	Std Dev	Sample Frequency	Density Mean	Std Dev
Gammarus spp	No Determ.	0	0.00	0.00	9	7799.50	13126.29	9	3899.75	9281.69
Gammarus spp	Gravid Fe.	0	0.00	0.00	3	85.60	119.51	3	42.80	84.51
Jassa falcata	No Determ.	1	23.50	0.00	1	17.40	38.91	2	20.45	27.51
Elasmopus levis	No Determ.	1	12.00	0.00	1	15.20	33.99	2	13.60	24.03
Melita nitida	No Determ.	2	28.75	0.00	5	97.80	108.58	7	63.28	76.78
Monoculodes edwardsi	No Determ.	1	21.25	0.00	5	147.40	179.49	6	84.33	126.92
Microprotopus raneyi	No Determ.	1	16.75	0.00	0	0.00	0.00	1	8.38	0.00
Family Stenothoidae	No Determ.	1	23.50	0.00	0	0.00	0.00	1	11.75	0.00
Suborder Caprellidea	No Determ.	2	47.50	0.00	3	50.30	88.79	5	48.90	62.79
Family Mysidae	No Determ.	0	0.00	0.00	1	53.00	118.51	1	26.50	83.80
Mysidopsis bigelowi	No Determ.	0	0.00	0.00	2	80.10	118.85	2	40.05	84.04
Neomysis americana	No Determ.	4	780.00	0.00	9	11112.50	7478.77	13	5946.25	5288.29
Neomysis americana	Gravid Fe.	0	0.00	0.00	3	312.90	569.78	3	156.45	402.89
Palaemonetes vulgaris	No Determ.	1	16.75	0.00	7	69.10	56.11	8	42.93	39.67
Crangon septemspinosa	Zoeal	4	1290.00	0.00	9	7841.10	8811.27	13	4565.55	6230.51
Crangon septemspinosa	No Determ.	1	16.75	0.00	8	1301.40	831.16	9	659.08	587.72
Sagitta spp.	No Determ.	1	16.75	0.00	3	87.90	124.54	4	52.33	88.06
Total								13	35857.10	

Total Number of Forms = 59

Table 36. Mean monthly densities (n/m^3) and percent composition of numerous[a] and important macrozooplankton taxa collected at the Oyster Creek Generating Station discharge (Sta. 11) and Mnemiopsis leidyi collected at the OCGS intake (Sta. 7) from 1 September 1978 through 31 March 1979.

TAXA (lifestage)	September		December		January		February		March		X	
	n/m^3	%	n/m^3	%	n/m^3	%	n/m^3	%	n/m^3	%	n/m^3	%
Neomysis americana (no determination & gravid)	3.05	18.8	3.77	19.9	12.73	55.9	9.39	63.2	6.10	17.0	7.01	32.3
Sarsia spp. (no determination)	0.00	0.0	0.00	0.0	0.00	0.0	0.03	0.2	14.21	39.6	2.85	13.1
Crangon septemspinosa (zoeal)	0.00	0.0	1.32	7.0	2.09	9.2	0.69	4.6	4.57	12.7	1.73	8.0
Ampelisca spp. (no determination & gravid)	2.33	14.4	2.76	14.5	0.07	0.3	0.47	3.2	0.88	2.5	1.30	6.0
Sagitta spp. (no determination)	0.00	0.0	0.30	1.6	4.77	20.8	0.21	1.4	0.05	0.1	1.07	4.9
Gammarus spp. (no determination)	0.00	0.0	0.00	0.0	0.01	< 0.1	0.28	1.9	3.90	10.9	0.84	3.9
Unidentified Polychaeta (no determination)	0.07	0.4	3.06	16.1	0.12	0.5	0.06	0.4	0.00	0.0	0.66	3.0
Leucon americanus (no determination)	1.41	8.7	1.14	6.0	0.09	0.4	0.07	0.5	0.52	1.5	0.64	2.9
Unidentified Polychaeta (larval)	0.01	< 0.1	0.17	0.9	1.02	4.5	0.62	4.2	0.83	2.3	0.53	2.4
Microdeutopus gryllotalpa (no determination & gravid)	0.06	0.4	1.41	7.4	0.03	0.1	0.00	0.0	0.59	1.6	0.42	1.9
Crangon septemspinosa (no determination & gravid)	0.02	0.1	0.55	2.9	0.65	2.9	0.29	2.0	0.66	1.8	0.43	2.0
Jassa falcata (no determination & gravid)	1.95	12.0	0.00	0.0	0.00	0.0	0.01	0.1	0.02	0.1	0.40	1.8
Cirripedia (cyprid)	0.00	0.0	0.00	0.0	0.00	0.0	0.73	4.9	1.07	3.0	0.36	1.7
Capitellidae (no determination)	0.00	0.0	1.08	5.7	0.05	0.2	0.26	1.8	0.06	0.2	0.29	1.3
Stenothoidae (no determination & gravid)	1.33	8.2	0.00	0.0	0.01	< 0.1	0.01	< 0.1	0.01	< 0.1	0.27	1.2
Caprellidea (no determination & gravid)	0.90	5.6	0.04	0.2	0.02	0.1	0.03	0.2	0.05	0.1	0.21	1.0
Gastropoda (larval)	1.01	6.2	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.20	0.9

Table 36. (cont.)

TAXA (lifestage)	September		December		January		February		March		$\bar{X}$	
	n/m³	%	n/m³	%	n/m³	%	n/m³	%	n/m³	%	n/m³	%
Oxyurostylis smithi (no determination & gravid)	0.72	4.4	0.05	0.3	0.02	0.1	0.01	0.1	0.08	0.2	0.18	0.8
Actiniaria (no determination)	0.05	0.3	0.73	3.8	0.01	< 0.1	0.02	0.1	0.02	0.1	0.17	0.8
Melita nitida (no determination)	0.22	1.4	0.36	1.9	<0.01	< 0.1	0.03	0.2	0.06	0.2	0.13	0.6
Polydora spp. (no determination)	0.08	0.5	0.20	1.1	0.02	0.1	0.01	0.1	0.34	0.9	0.13	0.6
Unidentified Amphipoda (no determination)	0.25	1.5	0.17	0.9	0.04	0.2	0.06	0.4	0.06	0.2	0.12	0.6
Corophium tuberculatum (no determination & gravid)	0.00	0.0	0.12	0.6	0.01	< 0.1	0.11	0.7	0.34	0.9	0.12	0.6
Edotea triloba (no determination)	0.39	2.4	0.16	0.8	0.00	0.0	0.02	0.1	0.00	0.0	0.11	0.5
Mysidopsis bigelowi (no determination & gravid)	0.28	1.7	0.09	0.5	0.07	0.3	0.03	0.2	0.04	0.1	0.10	0.5
Elasmopus levis (no determination & gravid)	0.15	0.9	0.26	1.4	0.01	< 0.1	0.03	0.2	0.01	<0.1	0.09	0.4
Cyclaspis varians (no determination)	0.34	2.1	0.06	0.3	0.01	< 0.1	< 0.01	< 0.1	0.02	0.1	0.08	0.4
Bivalvia (no determination)	0.00	0.0	0.10	0.5	0.03	0.1	0.05	0.3	0.23	0.6	0.08	0.4
Total macrozooplankton	16.19	-	18.97	-	22.78	-	14.65	-	35.86	-	21.73	-
OTHER IMPORTANT SPECIES												
Mnemiopsis leidyi (no determination)	7.44	-	1.78	-	0.05	-	0.00	-	0.00	-	-	-

[a] Organisms which comprised 95% (by density) of all macrozooplankton collected.

Table 37. Mean yearly densities (n/1000 cubic meters), frequency of collection and percent composition of macrozooplankton collected at the Oyster Creek Generating Station discharge (Sta. 11) from 1 September 1978 through 31 March 1979.

Yearly Mean Density At Location 11 From SEPTEMBER 78 Thru MARCH 79

Species	Lifestage	Frequency	Yearly Mean	Std Dev	% Composition
Total		65	21727.87		
Neomysis americana	No Determ.	63	6976.36	9042.88	32.11
Sarsia spp	No Determ.	17	2849.34	16962.30	13.11
Crangon septemspinosa	Zoeal	53	1733.91	2845.65	7.98
Ampelisca spp.	No Determ.	56	1283.59	905.18	5.91
Sagitta spp.	No Determ.	33	1064.26	1246.85	4.90
Gammarus spp	No Determ.	17	835.67	4163.15	3.85
Class Polychaeta	No Determ.	27	660.49	379.80	3.04
Leucon americanus	No Determ.	48	641.21	521.64	2.95
Class Polychaeta	Larval	40	528.59	521.36	2.43
Microdeutopus gryllotalpa	No Determ.	49	463.85	344.37	2.13
Crangon septemspinosa	No Determ.	41	435.02	462.32	2.00
Jassa falcata	No Determ.	16	377.80	382.84	1.74
Subclass Cirripedia	Cyprids	23	359.84	251.46	1.66
Family Capitellidae	No Determ.	26	290.12	308.10	1.34
Family Stenothoidae	No Determ.	15	268.73	150.50	1.24
Class Gastropoda	Larval	6	202.51	1113.18	0.93
Suborder Caprellidea	No Determ.	26	202.41	266.66	0.93
Oxyurostylis smithi	No Determ.	24	175.32	190.63	0.81
Order Actiniaria	No Determ.	25	166.63	110.10	0.77
Melita nitida	No Determ.	34	134.15	144.59	0.62
Polydora spp	No Determ.	21	130.85	449.84	0.60
Order Amphipoda	No Determ.	33	117.04	104.51	0.54
Edotea triloba	No Determ.	23	114.82	206.09	0.53
Corophium tuberculatum	No Determ.	23	113.80	300.77	0.52
Mysidopsis bigelowi	No Determ.	21	95.67	104.83	0.44
Elasmopus levis	No Determ.	27	92.38	79.06	0.43
Cyclaspis varians	No Determ.	16	84.19	179.40	0.39
Class Bivalvia	No Determ.	24	80.51	168.00	0.37
Monoculodes edwardsi	No Determ.	31	76.60	109.89	0.35
Family Gammaridae	No Determ.	16	76.06	181.67	0.35
Family Syllidae	No Determ.	17	71.86	193.73	0.33
The Above Organisms Comprised 95% of the Assemblage					
Gammarus annulatus	No Determ.	16	65.34	149.75	0.30
Palaemonetes vulgaris	No Determ.	28	61.96	64.44	0.29
Corophium spp	No Determ.	15	52.76	83.71	0.24
Stenothoe minuta	No Determ.	11	50.00	123.13	0.23
Mysidobdella oculata	No Determ.	19	47.58	78.02	0.22
Class Hirudinea	No Determ.	7	41.37	157.59	0.19
Gammarus annulatus	Gravid Fe.	12	33.59	120.10	0.15

Table 37. (cont.)

Species	Lifestage	Frequency	Yearly Mean	Std Dev	% Composition
Neomysis americana	Gravid Fe.	5	32.92	180.24	0.15
Cerapus tubularis	No Determ.	11	32.07	47.83	0.15
Corophium acherusicum	No Determ.	13	29.19	23.79	0.13
Class Hydrozoa	No Determ.	9	26.43	26.88	0.12
Subphylum Pycnogonida	No Determ.	11	26.23	47.55	0.12
Neopanope sayi	Zoeal	7	25.41	29.34	0.12
Gammarus mucronatus	No Determ.	16	22.58	51.77	0.10
Idotea baltica	No Determ.	16	22.20	23.58	0.10
Suborder Aeolidacea	No Determ.	9	17.50	28.92	0.08
Family Aoridae	No Determ.	8	17.41	17.70	0.08
Ampelisca spp.	Gravid Fe.	9	17.10	40.92	0.08
Jassa falcata	Gravid Fe.	5	16.98	62.61	0.08
Family Spionidae	No Determ.	2	16.85	86.10	0.08
Family Phyllodocidae	No Determ.	6	16.23	15.07	0.07
Phylum Invertebrata	No Determ.	5	15.65	56.66	0.07
Panopeus herbstii	Zoeal	5	14.23	26.13	0.07
Microdeutopus gryllotalpa	Gravid Fe.	4	13.51	75.76	0.06
Pagurus sp	Zoeal	5	11.69	31.39	0.05
Microprotopus raneyi	No Determ.	7	11.66	29.47	0.05
Unciola spp	No Determ.	5	11.61	12.56	0.05
Class Gastropoda	No Determ.	3	11.29	13.10	0.05
Palaemonetes spp	Zoeal	4	10.96	55.89	0.05
Gammarus spp	Gravid Fe.	5	10.50	39.06	0.05
Order Ceriantharia	Larval	6	9.88	30.19	0.05
Leptocheris plumulosus	No Determ.	4	9.79	34.90	0.05
Callinectes sapidus	Megalopal	5	9.24	12.00	0.04
Family Syllidae	Larval	2	8.73	17.71	0.04
Sphaerosyllis erinaceus	No Determ.	7	8.65	26.56	0.04
Infraorder Brachyura	Megalopal	5	8.20	30.23	0.04
Family Polynoidae	No Determ.	8	7.73	15.35	0.04
Marinogammarus sp	No Determ.	3	6.83	20.33	0.03
Mysidopsis bigelowi	Gravid Fe.	4	6.76	19.92	0.03
Tomopteris helgolandica	No Determ.	1	6.47	35.42	0.03
Family Mysidae	No Determ.	2	6.45	37.48	0.03
Family Molgulidae	No Determ.	5	6.45	13.74	0.03
Hydroides dianthus	No Determ.	3	6.40	0.00	0.03
Nereis spp	No Determ.	5	6.03	17.57	0.03
Suborder Caprellidea	Gravid Fe.	4	5.93	13.98	0.03
Nereis spp	Epitokes	4	5.90	22.08	0.03
Class Oligochaeta	No Determ.	4	5.82	15.42	0.03
Suborder Doridacea	No Determ.	3	5.51	18.71	0.03
Parametopella cypris	No Determ.	3	4.73	11.46	0.02
Palaemonetes spp	No Determ.	4	4.42	14.57	0.02
Podarke obscura	No Determ.	3	4.30	0.00	0.02
Family Xanthidae	Zoeal	2	4.24	26.80	0.02
Erichthonius spp	No Determ.	3	4.23	5.87	0.02

Table 37. (cont.)

Species	Lifestage	Frequency	Yearly Mean	Std Dev	% Composition
Obelia spp	No Determ.	2	4.06	18.66	0.02
Gyptis vittata	No Determ.	3	3.57	9.23	0.02
Corophium tuberculatum	Gravid Fe.	2	3.26	14.17	0.02
Mnemiopsis leidyi	No Determ.	1	3.23	17.71	0.01
Listriella barnardi	No Determ.	2	3.19	13.10	0.01
Scoloplos spp	No Determ.	2	3.19	13.10	0.01
Autolytus spp	No Determ.	5	2.98	6.25	0.01
Order Sabellida	No Determ.	1	2.86	18.10	0.01
Leucon americanus	Gravid Fe.	2	2.64	10.36	0.01
Margelopsis gibbesi	No Determ.	2	2.33	13.22	0.01
Microprotopus raneyi	Gravid Fe.	1	2.18	13.76	0.01
Sabella microphthalma	No Determ.	2	2.16	6.56	0.01
Brania clavata	No Determ.	1	2.13	0.00	0.01
Family Gammaridae	Gravid Fe.	2	2.12	16.40	0.01
Autolytus spp	Gravid Fe.	2	2.00	11.78	0.01
Idotea baltica	Gravid Fe.	2	1.98	0.00	0.01
Family Serpulidae	No Determ.	1	1.95	12.33	0.01
Exogone dispar	No Determ.	2	1.93	5.81	0.01
Class Holothuroidea	No Determ.	2	1.87	5.36	0.01
Stenothoe brevicornis	No Determ.	1	1.74	10.99	0.01
Eurypanopeus depressus	Zoeal	1	1.74	10.99	0.01
Argulus spp	No Determ.	1	1.74	10.99	0.01
Phylum Ctenophora	No Determ.	1	1.69	10.67	0.01
Sabellaria vulgaris	No Determ.	1	1.69	10.67	0.01
Family Stenothoidae	Gravid Fe.	1	1.69	10.67	0.01
Spirorbis spp	No Determ.	1	1.68	0.00	0.01
Orchomenella penguis	No Determ.	1	1.63	12.65	0.01
Leptocuma minor	No Determ.	1	1.57	12.14	0.01
Unciola serrata	No Determ.	2	1.48	2.39	0.01
Family Polynoidae	Larval	1	1.24	9.62	0.01
Corophium insidiosum	No Determ.	1	1.18	0.00	0.01
Erichthonius brasiliensis	No Determ.	1	1.18	0.00	0.01
Paranaitis spp	Larval	1	1.18	0.00	0.01
Glycera spp	No Determ.	1	1.18	0.00	0.01
Hippolyte spp.	Zoeal	1	1.15	0.00	0.01
Stenothoe minuta	Gravid Fe.	1	1.15	0.00	0.01
Callinectes sapidus	Juvenile	1	1.09	6.88	0.01
Elasmopus levis	Gravid Fe.	1	1.01	6.40	0.00
Corophium acherusicum	Gravid Fe.	1	1.01	7.14	0.00
Palaemonetes pugio	No Determ.	1	1.00	0.00	0.00
Parametopella cypris	Gravid Fe.	1	0.98	0.00	0.00
Ovalipes ocellatus	Zoeal	1	0.98	0.00	0.00
Class Nematoda	No Determ.	1	0.93	7.23	0.00
Corophium bonelli	No Determ.	1	0.90	6.36	0.00
Family Syllidae	Gravid Fe.	1	0.87	6.71	0.00
Infraorder Caridea	Zoeal	1	0.87	6.71	0.00

Table 37. (cont.)

Species	Lifestage	Frequency	Yearly Mean	Std Dev	% Composition
Order Decapoda	Zoeal	1	0.82	6.33	0.00
Lembos websteri	No Determ.	1	0.72	5.55	0.00
Family Terebellidae	No Determ.	1	0.69	5.36	0.00
Chiridotea coeca	No Determ.	1	0.44	3.11	0.00
Eteone heteropoda	No Determ.	1	0.41	2.90	0.00
Crepidula spp	No Determ.	1	0.38	2.90	0.00
Cyathura spp	No Determ.	1	0.34	2.65	0.00
Stauronereis rudolphi	No Determ.	1	0.31	2.39	0.00
Scolecolepides viridis	No Determ.	1	0.31	2.39	0.00
Gammarus mucronatus	Gravid Fe.	1	0.31	2.39	0.00

Total Number of Forms = 140

Table 38. Day and night densities (n/m^3) of numerous[a] and important macrozooplankton calculated from monthly 24-h collections at the Oyster Creek Generating Station discharge (Sta. 11) from 1 September 1978 through 31 March 1979.

TAXA (lifestage)		September n/m^3	December n/m^3	January n/m^3	February n/m^3	March n/m^3
Neomysis americana	D	0.18	0.70	7.40	2.85	0.78
(no determination and gravid)	N	5.56	9.71	10.16	20.70	14.02
Sarsia spp. (no determination)	D	0.00	0.00	0.00	0.02	0.07
	N	0.00	0.00	0.00	0.04	0.12
Crangon septemspinosa (zoeal)	D	0.00	0.77	2.26	0.59	1.29
	N	0.00	1.11	2.00	0.59	1.67
Ampelisca spp.	D	0.37	4.14	0.02	0.66	0.13
(no determination and gravid)	N	3.75	2.61	0.08	0.50	3.41
Sagitta spp. (no determination)	D	0.00	0.11	3.37	0.04	0.02
	N	0.00	0.00	3.03	0.05	0.00
Gammarus spp.	D	0.00	0.00	0.00	0.01	0.00
(no determination and gravid)	N	0.00	0.00	0.02	0.04	1.16
Unidentified Polychaeta	D	0.08	5.05	0.05	0.00	0.00
(no determination)	N	0.12	2.32	0.02	0.00	0.00
Leucon americanus	D	0.00	1.24	0.00	0.02	0.06
(no determination and gravid)	N	3.13	0.95	0.09	0.15	0.72
Unidentified Polychaeta (larval)	D	0.08	0.15	1.32	0.40	0.71
	N	0.00	0.00	0.81	0.49	0.62
Microdeutopus gryllotalpa	D	0.05	2.23	0.00	0.36	0.24
(no determination and gravid)	N	0.10	0.06	0.04	0.26	0.28

Table 38. (cont.)

TAXA (lifestage)		September n/m^3	December n/m^3	January n/m^3	February n/m3	March n/m^3
Crangon septemspinosa	D	0.00	0.21	0.02	0.00	0.02
(no determination and gravid)	N	0.02	0.00	0.45	0.21	1.65
Jassa falcata	D	1.32	0.00	0.00	0.00	0.02
(no determination and gravid)	N	2.59	0.00	0.00	0.03	0.00
Cirripedia (cyprid)	D	0.00	0.00	0.00	1.00	0.86
	N	0.00	0.00	0.00	0.69	0.72
Capitellidae (no determination)	D	0.00	1.76	0.00	0.08	0.00
	N	0.00	0.88	0.00	0.10	0.00
Stenothoidae	D	1.35	0.00	0.02	0.01	0.02
(no determination and gravid)	N	1.60	0.00	0.00	0.00	0.00
Caprellidea	D	0.33	0.09	0.05	0.03	0.05
(no determination and gravid)	N	1.45	0.00	0.02	0.04	0.15
Gastropoda (larval)	D	0.22	0.00	0.00	0.00	0.00
	N	0.07	0.00	0.00	0.00	0.00
Oxyurostylis smithi	D	0.07	0.00	0.03	0.00	0.00
(no determination and gravid)	N	1.65	0.10	0.01	0.03	0.11
Actiniara (no determination)	D	0.07	1.20	0.00	0.02	0.00
	N	0.00	0.62	0.01	0.02	0.02
Melita nitida (no determination)	D	0.08	0.35	0.00	0.01	0.03
	N	0.32	0.63	0.06	0.02	0.06
Polydora spp. (no determination)	D	0.07	0.24	0.04	0.02	0.00
	N	0.17	0.37	0.01	0.00	0.00

Table 38. (cont.)

TAXA (lifestage)		September n/m^3	December n/m^3	January n/m^3	February n/m^3	March n/m^3
Unidentified Amphipoda	D	0.10	0.11	0.00	0.06	0.04
(no determination)	N	0.35	0.33	0.00	0.09	0.02
Corophium tuberculatum	D	0.00	0.12	0.02	0.11	0.02
(no determination and gravid)	N	0.00	0.22	0.01	0.13	0.04
Edotea triloba (no determination)	D	0.13	0.18	0.00	0.03	0.00
	N	0.52	0.26	0.00	0.00	0.00
Mysidopsis bigelowi	D	0.01	0.00	0.08	0.00	0.00
(no determination and gravid)	N	0.59	0.05	0.18	0.00	0.07
Elasmopus levis	D	0.09	0.27	0.00	0.04	0.01
(no determination and gravid)	N	0.16	0.49	0.00	0.03	0.00
Cyclaspis varians	D	0.03	0.06	0.00	0.00	0.00
(no determination)	N	0.46	0.00	0.00	0.00	0.00
Bivalvia (no determination)	D	0.00	0.09	0.02	0.05	0.01
	N	0.00	0.22	0.02	0.00	0.23

[a] Organisms which comprised 95% (by density) of all macrozooplankton collected.

Table 39. Mean density (n/1000m^3) of ichthyoplankton collected at the discharge (Sta. 11) of the Oyster Creek Generating Station from September 1978 through March 1979.

Mean Density At Location 11 From SEPTEMBER 78 Thru MARCH 79

Species	Lifestage	Frequency	Yearly Mean	Std Dev	% Composition
Total Eggs		66	3979.64		
Pseudopleuronectes americanus	Egg	31	3693.10	17579.90	92.80
Unidentified fish	Egg	20	261.50	554.24	6.57
The Above Organisms Comprised 95% of the Eggs					
Ammodytes sp.	Egg	5	13.55	15.62	0.34
Anchoa mitchilli	Egg	5	11.49	40.56	0.29
Total Larvae and Juveniles		66	4595.25		
Ammodytes sp.	Larval	48	2965.16	6268.63	64.53
Pseudopleuronectes americanus	Larval	18	1314.50	3574.86	28.61
Anchoa mitchilli	Larval	11	230.79	250.75	5.02
The Above Organisms Comprised 95% of the Larvae and Juveniles					
Anguilla rostrata	Larval	19	32.48	68.81	0.71
Anchoa mitchilli	Juvenile	15	25.78	36.23	0.56
Family Blenniidae	Larval	4	11.11	5.14	0.24
Syngnathus fuscus	Juvenile	3	6.55	0.00	0.14
Gadus morhua	Larval	2	3.55	0.00	0.08
Family Gobiidae	Larval	2	2.08	6.01	0.05
Unidentified fish	Larval	1	1.19	9.23	0.03
Pholis gunnellus	Larval	1	1.18	0.00	0.03
Brevoortia tyrannus	Juvenile	1	0.51	3.61	0.01
Paralichthys dentatus	Larval	1	0.38	2.69	0.01

Table 40. Monthly mean densities (n/1000m^3) of ichthyoplankton collected at the discharge (Sta. 11) of the Oyster Creek Generating Station from September 1978 through March 1979.

Species	Lifestage	Frequency	Mean	Std Dev	% Composition
Monthly Mean Density During SEPTEMBER 78					
Total Eggs		12	57.44		
Anchoa mitchilli	Egg	5	57.44	90.69	100.00
Total Number of Forms = 1					
Total Larvae and Juveniles		12	1362.43		
Anchoa mitchilli	Larval	11	1153.93	560.69	84.70
Anchoa mitchilli	Juvenile	10	109.81	76.47	8.06
Family Blenniidae	Larval	4	55.56	11.49	4.08
The Above Organisms Comprised 95% of the Larvae and Juveniles					
Syngnathus fuscus	Juvenile	3	32.75	0.00	2.40
Family Gobiidae	Larval	2	10.38	13.44	0.76
Total Number of Forms = 5					

Table 40. (cont.)

Monthly Mean Density During DECEMBER 78

Species	Lifestage	Frequency	Mean	Std Dev	% Composition
Total Larvae and Juveniles		14	4658.30		
Ammodytes sp.	Larval	9	4636.65	13563.70	99.54
The Above Organisms Comprised 95% of the Larvae and Juveniles					
Anchoa mitchilli	Juvenile	5	19.10	26.72	0.41
Brevoortia tyrannus	Juvenile	1	2.55	8.06	0.05
Total Number of Forms = 3					

Table 40. (cont.)

Monthly Mean Density During JANUARY 79					
Species	Lifestage	Frequency	Mean	Std Dev	% Composition
Total Eggs		10	1949.87		
Pseudopleuronectes americanus	Egg	5	1171.37	317.82	60.07
Unidentified fish	Egg	8	723.33	147.66	37.10
The Above Organisms Comprised 95% of the Eggs					
Ammodytes sp.	Egg	2	55.17	24.29	2.83
Total Number of Forms = 3					
Total Larvae and Juveniles		10	6376.87		
Ammodytes sp.	Larval	10	6323.45	3431.92	99.16
The Above Organisms Comprised 95% of the Larvae and Juveniles					
Anguilla rostrata	Larval	3	35.67	65.93	0.56
Gadus morhua	Larval	2	17.75	0.00	0.28
Total Number of Forms = 3					

Table 40. (cont.)

Monthly Mean Density During JANUARY 79

Species	Lifestage	Frequency	Mean	Std Dev	% Composition
Total Eggs		10	1949.87		
Pseudopleuronectes americanus	Egg	5	1171.37	317.82	60.07
Unidentified fish	Egg	8	723.33	147.66	37.10
The Above Organisms Comprised 95% of the Eggs					
Ammodytes sp.	Egg	2	55.17	24.29	2.83
Total Number of Forms = 3					
Total Larvae and Juveniles		10	6376.87		
Ammodytes sp.	Larval	10	6323.45	3431.92	99.16
The Above Organisms Comprised 95% of the Larvae and Juveniles					
Anguilla rostrata	Larval	3	35.67	65.93	0.56
Gadus morhua	Larval	2	17.75	0.00	0.28
Total Number of Forms = 3					

Table 40. (cont.)

Monthly Mean Density During FEBRUARY 79

Species	Lifestage	Frequency	Mean	Std Dev	% Composition
Total Eggs		16	10418.16		
Pseudopleuronectes americanus	Egg	15	9982.41	33045.70	95.82
The Above Organisms Comprised 95% of the Eggs					
Unidentified fish	Egg	8	429.25	1176.09	4.12
Ammodytes sp.	Egg	2	6.50	16.04	0.06
Total Number of Forms = 3					
Total Larvae and Juveniles		16	3307.07		
Ammodytes sp.	Larval	16	3233.45	804.57	97.77
The Above Organisms Comprised 95% of the Larvae and Juveniles					
Anguilla rostrata	Larval	7	36.79	63.48	1.11
Pseudopleuronectes americanus	Larval	4	25.00	20.33	0.76
Unidentified fish	Larval	1	5.96	20.64	0.18
Pholis gunnellus	Larval	1	5.88	0.00	0.18
Total Number of Forms = 5					

Table 40. (cont.)

Monthly Mean Density During MARCH 79

Species	Lifestage	Frequency	Mean	Std Dev	% Composition
Total Eggs		14	7472.87		
Pseudopleuronectes americanus	Egg	11	7311.87	21287.60	97.85
The Above Organisms Comprised 95% of the Eggs					
Unidentified fish	Egg	4	154.90	361.76	2.07
Ammodytes sp.	Egg	1	6.10	19.29	0.08
Total Number of Forms = 3					
Total Larvae and Juveniles		14	7271.70		
Pseudopleuronectes americanus	Larval	14	6547.52	7993.61	90.04
Ammodytes sp.	Larval	13	632.33	280.84	8.70
The Above Organisms Comprised 95% of the Larvae and Juveniles					
Anguilla rostrata	Larval	9	89.95	123.68	1.24
Paralichthys dentatus	Larval	1	1.90	6.01	0.03
Total Number of Forms = 4					

Table 41. Estimated entrainment, with 80% confidence interval, of important and common ichthyoplankton at the Oyster Creek Generating Station from September 1978 through March 1979.

SPECIES	LIFE STAGE	ENTRAINMENT ESTIMATE	CONFIDENCE ± INTERVAL
Anchoa mitchilli	larvae and juveniles	8.37×10^7	$\pm 5.93 \times 10^7$
Ammodytes sp.	larvae	1.03×10^9	$\pm 5.05 \times 10^8$
Pseudopleuronectes americanus	eggs	1.56×10^9	$\pm 1.28 \times 10^9$
Pseudopleuronectes americanus	larvae	4.72×10^8	$\pm 3.07 \times 10^8$
Auguilla rostrata	larvae	1.20×10^7	$\pm 5.37 \times 10^6$
Total	eggs	1.66×10^9	$\pm 1.29 \times 10^9$
Total	larvae and juveniles	1.61×10^9	$\pm 5.39 \times 10^8$

Table 42. Monthly day and night densities (n/1000 cubic meters) of ichthyoplankton collected at the discharge (Sta. 11) of the Oyster Creek Generating Station from September 1978 through March 1979.

SEPTEMBER 78

Species	Lifestage	Sample Frequency	Density Mean/Day	Std Dev	Sample Frequency	Density Mean/Night	Std Dev	Sample Frequency	Density Mean	Std Dev
Anchoa mitchilli	Juvenile	2	19.75	0.00	8	199.88	108.15	10	109.81	76.47
Anchoa mitchilli	Larval	4	1121.25	0.00	7	1186.63	792.94	11	1153.94	560.69
Anchoa mitchilli	Egg	3	50.75	0.00	2	64.13	128.25	5	57.44	90.69
Syngnathus fuscus	Juvenile	3	65.50	0.00	0	0.00	0.00	3	32.75	0.00
Family Blenniidae	Larval	3	103.00	0.00	1	8.13	16.25	4	55.56	11.49
Family Gobiidae	Larval	1	11.25	0.00	1	9.50	19.00	2	10.38	13.44
Total								12	1419.88	

Total Number of Forms = 6

Table 42. (cont.)

DECEMBER 78

Species	Lifestage	Sample Frequency	Density Mean/Day	Std Dev	Sample Frequency	Density Mean/Night	Std Dev	Sample Frequency	Density Mean	Std Dev
Brevoortia tyrannus	Juvenile	0	0.00	0.00	1	5.10	11.40	1	2.55	8.06
Anchoa mitchilli	Juvenile	0	0.00	0.00	5	38.20	37.78	5	19.10	26.72
Ammodytes sp.	Larval	3	329.50	0.00	6	8943.80	19182.10	9	4636.65	13563.79
Total								14	4658.30	

Total Number of Forms = 3

Table 42. (cont.)

JANUARY 79

Species	Lifestage	Sample Frequency	Density Mean/Day	Std Dev	Sample Frequency	Density Mean/Night	Std Dev	Sample Frequency	Density Mean	Std Dev
Anguilla rostrata	Larval	1	17.50	0.00	2	53.83	93.24	3	35.67	65.93
Gadus morhua	Larval	2	35.50	0.00	0	0.00	0.00	2	17.75	0.00
Ammodytes sp.	Larval	4	6374.75	0.00	6	6272.17	4853.49	10	6323.46	3431.94
Ammodytes sp.	Egg	1	90.50	0.00	1	19.83	34.35	2	55.17	24.29
Pseudopleuronectes americanus	Egg	3	2083.25	0.00	2	259.50	449.47	5	1171.38	317.82
Unidentified fish	Egg	4	1123.50	0.00	4	323.17	208.82	8	723.33	147.66
Total								10	8326.75	

Total Number of Forms = 6

Table 42. (cont.)

FEBRUARY 79

Species	Lifestage	Sample Frequency	Density Mean/Day	Std Dev	Sample Frequency	Density Mean/Night	Std Dev	Sample Frequency	Density Mean	Std Dev
Anguilla rostrata	Larval	0	0.00	0.00	7	73.58	89.77	7	36.79	63.48
Pholis gunnellus	Larval	1	11.75	0.00	0	0.00	0.00	1	5.88	0.00
Ammodytes sp.	Larval	4	3360.25	0.00	12	3106.67	1137.83	16	3233.46	804.57
Ammodytes sp.	Egg	0	0.00	0.00	2	13.00	22.68	2	6.50	16.04
Pseudopleuronectes americanus	Larval	2	34.50	0.00	2	15.50	28.75	4	25.00	20.33
Pseudopleuronectes americanus	Egg	4	318.00	0.00	11	19646.83	46733.74	15	9982.42	33045.74
Unidentified fish	Larval	0	0.00	0.00	1	11.92	29.19	1	5.96	20.64
Unidentified fish	Egg	1	11.75	0.00	7	846.75	1663.26	8	429.25	1176.10
Total								16	13725.25	

Total Number of Forms = 8

Table 42. (cont.)

MARCH 79

Species	Lifestage	Sample Frequency	Density Mean/Day	Std Dev	Sample Frequency	Density Mean/Night	Std Dev	Sample Frequency	Density Mean	Std Dev
Anguilla rostrata	Larval	0	0.00	0.00	9	179.90	174.91	9	89.95	123.68
Ammodytes sp	Larval	4	571.25	0.00	9	693.40	397.16	13	632.33	280.84
Ammodytes sp	Egg	0	0.00	0.00	1	12.20	27.28	1	6.10	19.29
Paralichthys dentatus	Larval	0	0.00	0.00	1	3.80	8.50	1	1.90	6.01
Pseudopleuronectes americanus	Larval	4	647.75	0.00	10	12447.30	11304.69	14	6547.53	7993.62
Pseudopleuronectes americanus	Egg	4	807.75	0.00	7	13816.00	30105.24	11	7311.88	21287.62
Unidentified fish	Egg	2	81.00	0.00	2	228.80	511.61	4	154.90	361.76
Total								14	14744.58	

Total Number of Forms = 7

Table 43. Monthly totals of live, dead, and damaged ichthyoplankton collected at the intake (Sta. 7) and discharge (Sta. 11) of the Oyster Creek Generating Station during March and April 1979.

Date		March 1979		
Location		7	11(Operating)	11(Shutdown)
Air Temp. (C)		4.6- 15.0	15.0- 15.0	4.6- 4.6
Water Temp.(C)	surface	9.2- 12.5	19.3- 19.3	8.3- 8.3
	bottom	- - -	- - -	- - -
Salinity (ppt)	surface	12.0- 14.0	15.5- 15.5	16.5- 16.5
	bottom	- - -	- - -	- - -
Oxygen (ppm)	surface	9.6- 10.6	10.8- 10.8	11.3- 11.3
	bottom	- - -	- - -	- - -
pH	surface	7.5- 8.0	7.7- 7.7	7.8- 7.8
	bottom	- - -	- - -	- - -

	Alive		Dead		Damaged		Alive		Dead		Damaged		Alive		Dead		Damaged	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
LARVAE																		
Ammodytes sp.	8	62	4	31	1	8	0	0	1	100	0	0	4	31	6	46	3	23
Pseudopleuronectes americanus	62	71	12	14	13	15	14	37	21	55	3	8	48	61	19	24	12	15

Date		April 1979		
Location		7	11(Operating)	11(Shutdown)
Air Temp. (C)		6.5- 14.0	12.5- 12.5	6.5- 8.5
Water Temp.(C)	surface	9.5- 10.6	20.8- 20.8	11.0- 12.0
	bottom	9.7- 11.3	- - -	- - -
Salinity (ppt)	surface	8.0- 16.0	17.0- 17.0	11.0- 15.0
	bottom	12.0- 16.5	- - -	- - -
Oxygen (ppm)	surface	9.8- 10.3	11.3- 11.3	10.0- 10.2
	bottom	9.8- 10.1	- - -	- - -
pH	surface	7.7- 7.8	7.3- 7.3	7.4- 7.6
	bottom	7.6- 7.8	- - -	- - -

	Alive		Dead		Damaged		Alive		Dead		Damaged		Alive		Dead		Damaged	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
LARVAE																		
Anguilla rostrata	2	100	0	0	0	0	-	-	-	-	-	-	3	100	0	0	0	0
Ammodytes sp.	47	84	4	7	5	9	8	19	30	71	4	10	9	69	4	31	0	0
Myoxocephalus sp.	-	-	-	-	-	-	0	0	1	100	0	0	-	-	-	-	-	-
Pseudopleuronectes americanus	22	73	5	17	3	10	3	33	5	56	1	11	11	50	4	18	7	32
JUVENILES																		
Paralichthys dentatus	-	-	-	-	-	-	-	-	-	-	-	-	1	100	0	0	0	0

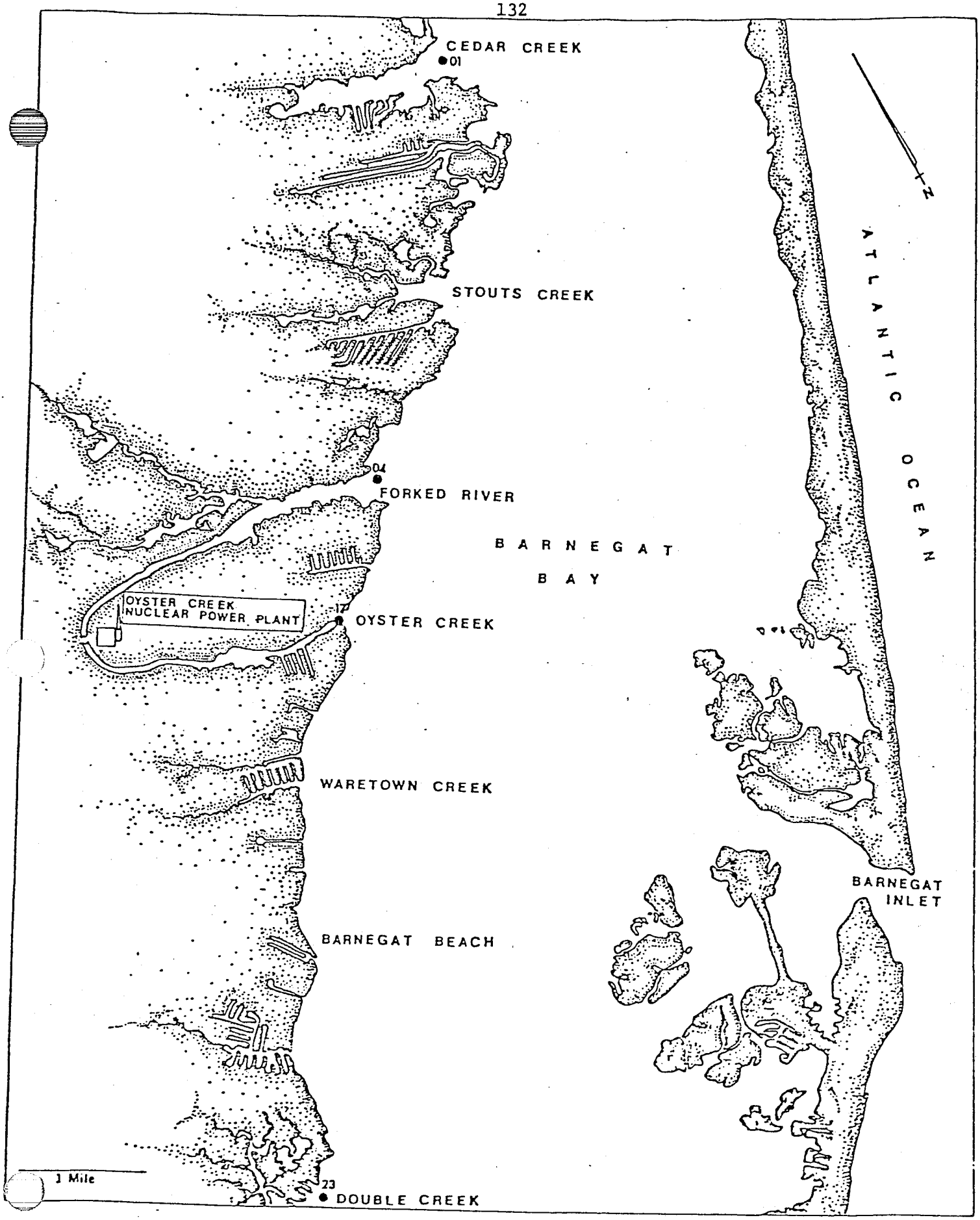

Fig. 1. Sampling locations for biological collections taken for the OCGS ecological study.

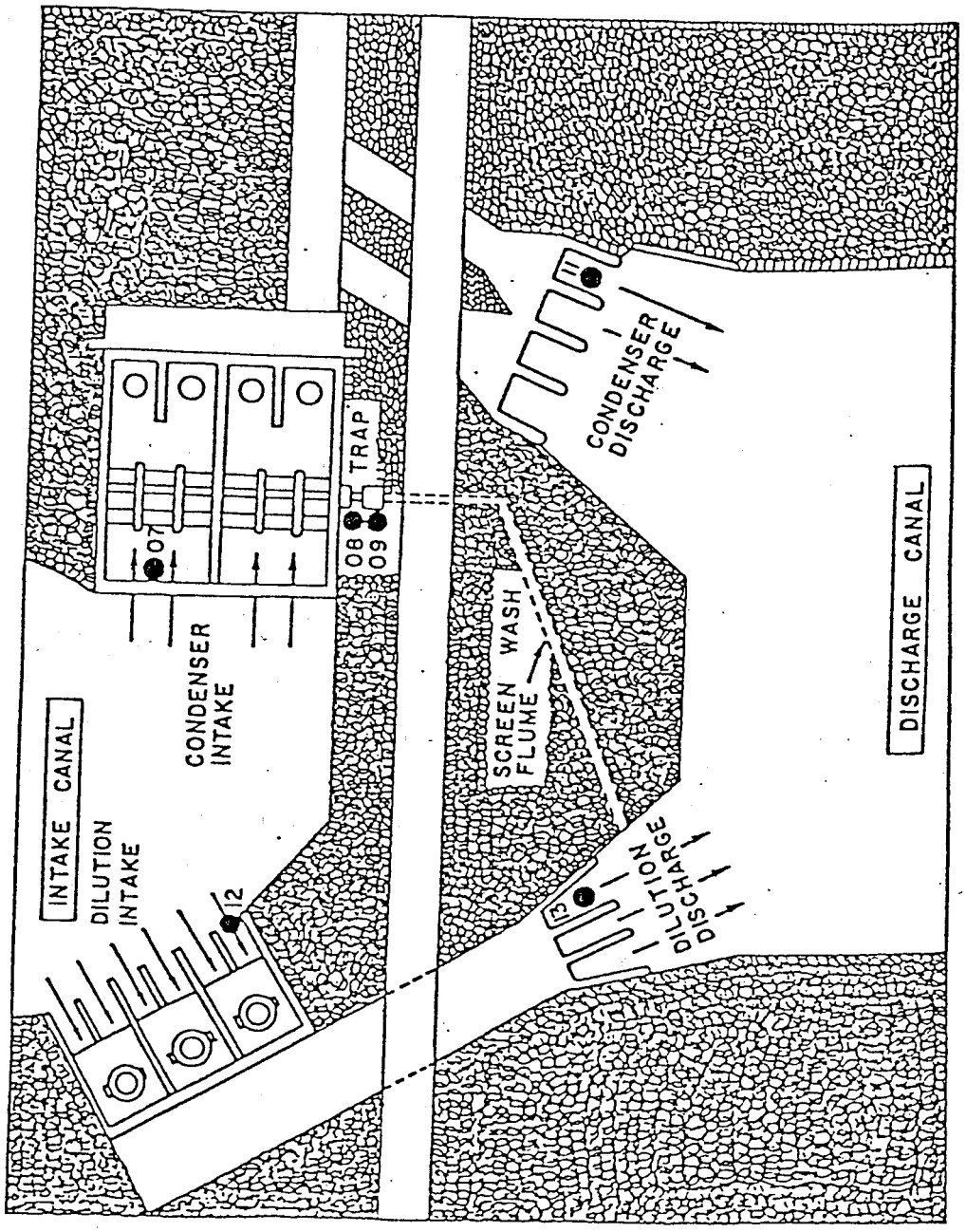

Fig. 2. Diagram of the intake and discharge of the circulating water system and the dilution pumps at the Oyster Creek Generating Station.

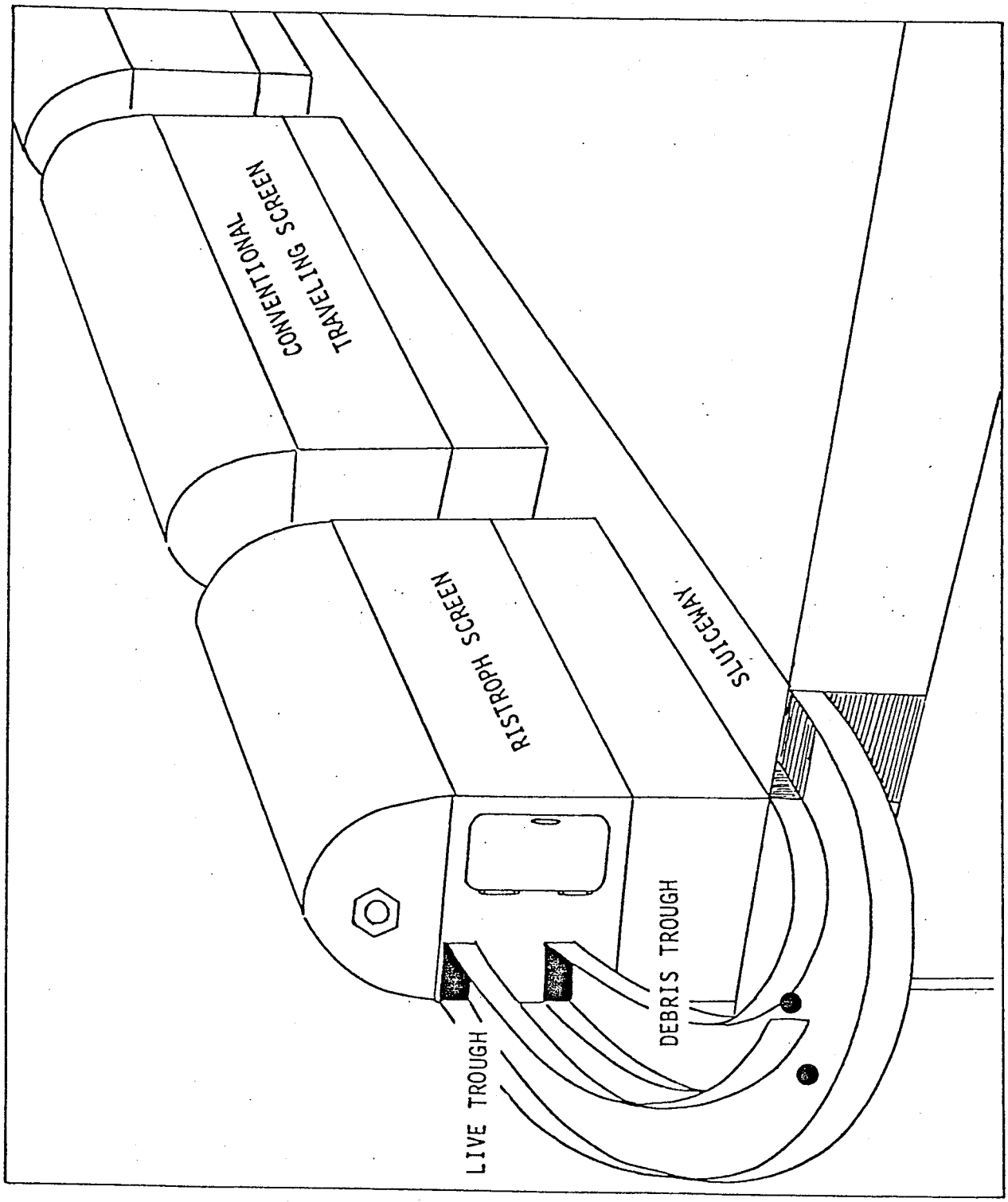

Fig. 3. Sampling locations (●) for biological collections from the Ristroph screen at the Oyster Creek Generating Station.

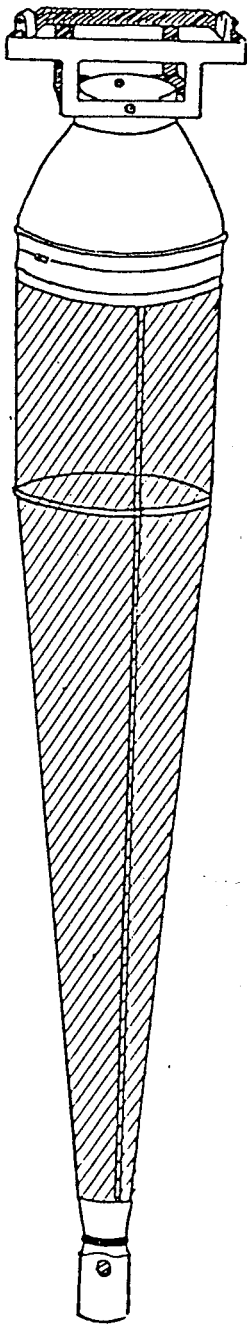

Figure 4. The ichthyoplankton mortality sampler with velocity reduction cone and modified cylinder-cone net used to collect ichthyoplankton for condition determinations.